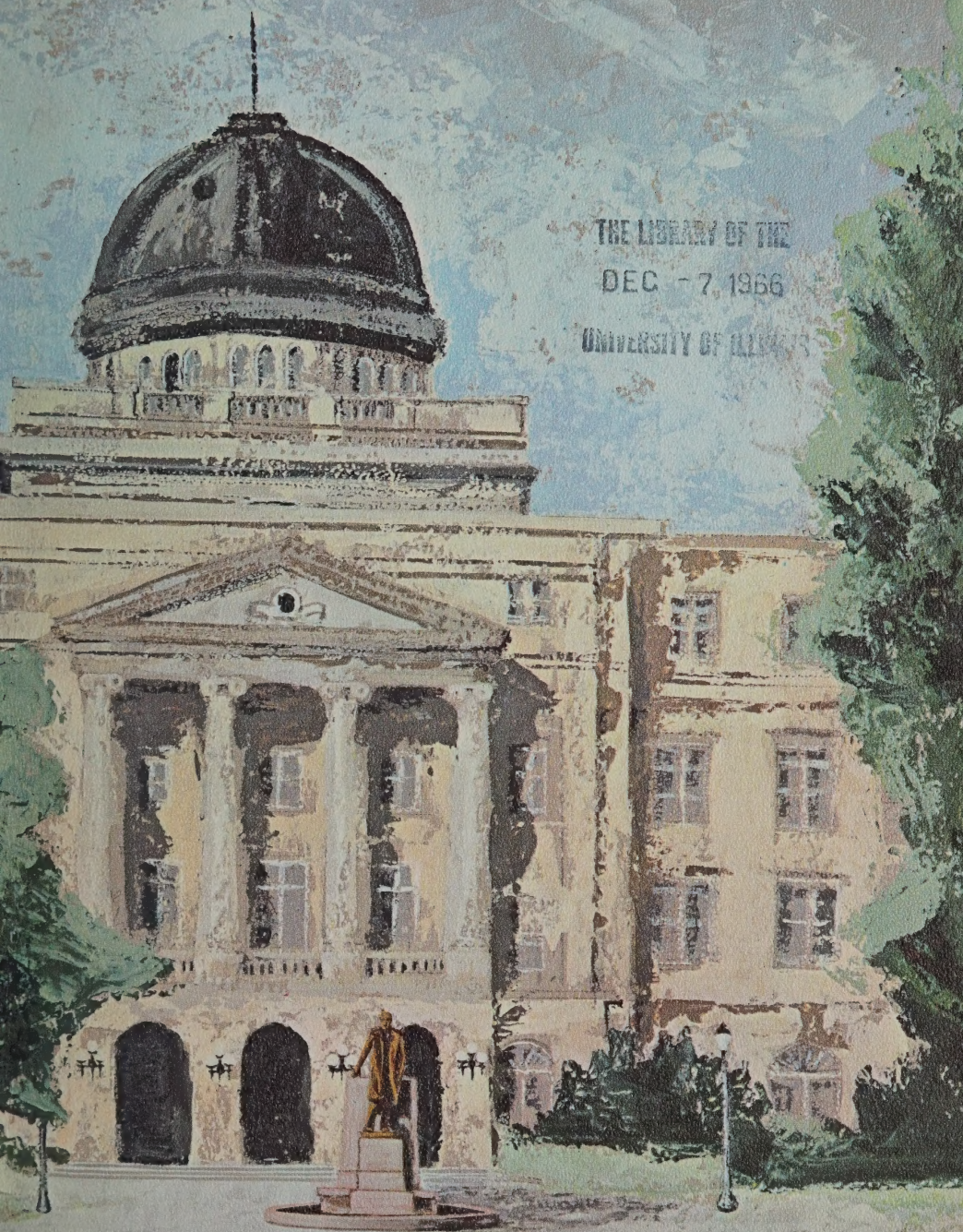


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*Bulletin of* **Texas A&M University**  
**1966-67**

FEBRUARY 1, 1966







## AMENDED SCHEDULE OF FEES

AS SET OUT ON PAGES 11 AND 12

For all students except those in the professional College of Veterinary Medicine:

FULL SEMESTER	FALL 1966	SPRING 1967
Tuition	\$ 50.00	\$ 50.00
Student Services	18.00	18.00
Building Use	16.00	16.00
Property Deposit	10.00	—
Student Activities	25.30	—
Board, Including Tax	198.00	198.00
Room Rent (non air-conditioned) and Laundry	110.00	110.00
Room Deposit	20.00	—
Identification Card	1.00	—
<b>TOTAL</b>	<b>\$448.30</b>	<b>\$392.00</b>
Air-Conditioned Room, additional charge	45.00	45.00
<b>TOTAL</b>	<b>\$493.30</b>	<b>\$437.00</b>

Board may be paid in three installments of \$67.00 each with a service charge of \$3.00.

For students enrolled in the professional College of Veterinary Medicine:

FULL TRIMESTER	FIRST TRIMESTER	SECOND TRIMESTER	THIRD TRIMESTER
Tuition	\$ 50.00	\$ 50.00	\$ 50.00
Student Services	18.00	18.00	18.00
Building Use	16.00	16.00	16.00
Property Deposit	10.00	—	—
Student Activities	25.30	—	—
Board, Including Tax	171.00	171.00	58.00*
Room Rent (non-air-conditioned) and Laundry	98.00	98.00	98.00
Room Deposit	20.00	—	—
Identification Card	1.00	—	—
<b>TOTAL</b>	<b>\$409.30</b>	<b>\$353.00</b>	<b>\$240.00</b>
Air-Conditioned Room, additional charge	40.00	40.00	40.00
<b>TOTAL</b>	<b>\$449.30</b>	<b>\$393.00</b>	<b>\$280.00</b>

Board may be paid in three installments of \$58.00 each with a service charge of \$3.00.

\*Third Trimester board paid at registration covers meals from April 24 through May 27 — \$58.00.







BULLETIN  
OF  
TEXAS A&M UNIVERSITY

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Sixth Series, Vol. 13

February 1, 1966

No. 1

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GENERAL CATALOGUE  
RECORD OF SESSION 1965-66  
ANNOUNCEMENTS FOR THE SESSION 1966-67



89

COLLEGE STATION, TEXAS

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# THE ACADEMIC CALENDAR FOR 1966-67

## SUMMER SESSION, 1966

June 6	Monday. Registration for the first term, 7 a.m. to 12 noon.
June 7	Tuesday. Beginning of classes, 7 a.m.
June 9	Thursday. Last day for enrolling in the University for the first term and for making changes in registration.
July 4	Monday. A holiday.
July 14	Thursday. Beginning of first term final examinations, 7 p.m.
July 15	Friday. Last day of first term final examinations.
July 18	Monday. Registration for the second term, 7 a.m. to 12 noon.
July 19	Tuesday. Beginning of classes, 7 a.m.
July 21	Thursday. Last day for enrolling in the University for the second term and for making changes in registration.
August 25	Thursday. Beginning of second term final examinations, 7 p.m.
August 26	Friday. Last day of second term final examinations.

## REGULAR SESSION, 1966-67

September 14	Wednesday. New freshmen who participated in the summer conferences report to campus.
September 14-15	Wednesday and Thursday. New Student Program and registration.
September 15	Thursday. Registration of all other students, 1 p.m. to 5 p.m.
September 16	Friday. Continuation of registration of all other students, 8 a.m. to 5 p.m.
September 17-18	Saturday and Sunday. Organization of Cadet Corps.
September 19	Monday. Beginning of Fall Semester classes, 8 a.m.
September 24	Saturday. Last day for enrolling in the University for the Fall Semester or for adding new courses.
September 28	Wednesday. Last day in the Fall Semester for dropping courses with no grade.
November 14	Monday. Mid-semester grade reports.
November 24-27	Thursday-Sunday, inclusive. Thanksgiving holidays.
December 17	Saturday, noon. Beginning of Christmas recess for all students.
January 2, 1967	Monday. End of Christmas recess.
January 21	Saturday. Commencement.
January 23	Monday. First day of semester examinations.
January 28	Saturday. Last day of semester examinations.
February 1	Wednesday. New freshmen report to campus for Spring Semester.
February 3	Friday. Registration for Spring Semester, 1 p.m. to 5 p.m.
February 4	Saturday. Continuation of registration for Spring Semester, 8 a.m. to 5 p.m.
February 6	Monday. Beginning of classes, Spring Semester, 8 a.m.



February 11	Saturday. Last day for enrolling in the University for the Spring Semester or for adding new courses.
February 15	Wednesday. Last day in Spring Semester for dropping courses with no grade.
March 22	Wednesday. Beginning of Spring recess, 5 p.m.
March 28	Tuesday. End of Spring recess, 8 a.m.
April 3	Monday. Mid-semester grade reports.
May 27	Saturday. Commencement and Final Review.
May 29	Monday. First day of semester examinations.
June 3	Saturday. Last day of semester examinations.

## SUMMER SESSION, 1967

June 5	Monday. Registration for the first term, 7 a.m. to 12 noon.
June 6	Tuesday. Beginning of classes, 7 a.m.
June 8	Thursday. Last day for enrolling in the University for the first term and for making changes in registration.
July 4	Tuesday. A holiday.
July 13	Thursday. Beginning of first term final examinations, 7 p.m.
July 14	Friday. Last day of first term final examinations.
July 17	Monday. Registration for the second term, 7 a.m. to 12 noon.
July 18	Tuesday. Beginning of classes, 7 a.m.
July 20	Thursday. Last day for enrolling in the University for the second term and for making changes in registration.
August 24	Thursday. Beginning of second term final examinations, 7 p.m.
August 25	Friday. Last day of second term final examinations.

## COLLEGE OF VETERINARY MEDICINE

September 3, 1966	Saturday. Registration for first trimester, 8 a.m. to 12 noon.
September 5	Monday. Beginning of classes for first trimester, 8 a.m.
November 24-27	Thursday-Sunday, inclusive. Thanksgiving holidays.
December 17	Saturday. End of first trimester and registration for second trimester, 8 a.m.
December 17	Saturday, noon. Beginning of Christmas recess.
January 2, 1967	Monday. End of Christmas recess and beginning of classes for second trimester, 8 a.m.
March 24-27	Friday-Monday, inclusive. Easter holidays.
April 15	Saturday. End of second trimester and registration for third trimester, 8 a.m.
April 16-23	Spring recess.
April 24	Monday. Beginning of classes for third trimester, 8 a.m.
July 1-4	Saturday-Tuesday, inclusive. Independence Day holiday.
August 5	Saturday, noon. End of third trimester.

# The Texas A&M University System

Composed of Texas A&M University and all colleges, agencies and services under the supervision of the Board of Directors of Texas A&M University, including:

## Texas A&M University

Texas Agricultural Experiment Station

Texas Agricultural Extension Service

Texas Engineering Experiment Station

Texas Engineering Extension Service

Texas Transportation Institute

Texas Maritime Academy

James Connally Technical Institute

Tarleton State College

Prairie View Agricultural and Mechanical College

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# Texas A&M University

Texas A&M University is the state's oldest public institution of higher education. It owes its origin to the Morrill Act approved by the Congress on July 2, 1862. This act provided for donation of public land to the several states to be sold at auction and the proceeds set aside in a perpetual fund. The act directed that interest from this fund "be used to support a technological college whose objective must be, without excluding other scientific and classical studies and including military tactics, to teach branches of learning pertaining to agriculture and mechanical arts in order to promote the liberal and practical education of the industrial classes in the various pursuits and professions of life . . ."

By act of the Legislature of Texas, 180,000 acres of land scrip were sold at 87 cents per acre on April 17, 1871. Proceeds from the sale went into \$174,000 of gold frontier defense bonds of Texas, forming the perpetual endowment for the institution. This same act appropriated \$75,000 for the erection of buildings and bound the state to defray all expenses of administration of the college exceeding the annual interest from the endowment. A commission created to locate the institution accepted the offer of 2,416 acres of land from citizens of Brazos County and instruction began in 1876.

As the state of Texas grew, so did its land-grant college. By 1963, the institution had grown in physical size to a \$60,000,000 institution embracing the study of science, the arts, architecture, veterinary medicine, business, education, marine engineering and transportation in addition to the mainstays of engineering and agriculture. Graduate programs of study and research had gained national stature.

In keeping with the diversified and expanded character of the institution, the 58th Legislature of Texas changed the name of the college on August 23, 1963, to Texas A&M University.

## LOCATION

The community of College Station surrounds the campus of Texas A&M University. This town boasts of churches representing the leading denominations, an excellent public school system, adequate shopping districts to serve its citizens, and motels and restaurants to accomodate guests of students and staff of the University. Nearby Bryan supplements these advantages.

With the exception of the Maritime Academy, all instruction is conducted on the main campus at College Station. This university community is located 100 miles north of Houston, 100 miles east of Austin, and 170 miles south of Dallas. State highways, Greyhound bus lines, and Trans Texas Airways serve to connect College Station with the rest of the State. Easterwood Field, the University airport, is located approximately two miles from the campus. First-year students in the Maritime Academy attend classes on the main campus. The following three years of instruction are given at the Texas Maritime Academy Campus, located in Galveston, a city 50 miles south of Houston and on the Gulf of Mexico.

## ACCREDITATION

The Texas A&M University is accredited by the Southern Association of Colleges and Schools, the Association of Texas Colleges and Universities, and the Texas Education Agency. The curricula in architecture are accredited by the National Architectural Accrediting Board, and the veterinary medicine degree program is accredited by the American Veterinary Medical Association Council on Education. All of the undergraduate engineering curricula are accredited by the Engineers' Council for Professional Development. Other accrediting agencies which have approved programs offered at the University are the American Chemical Society and the American Council on Education for Journalism.

## LIBRARY FACILITIES

**Cushing Memorial Library:** The main University Library, which serves also as the research library of the Texas Agricultural Experiment Station and of the Texas Agricultural Extension Service is in a centrally located, air-conditioned building housing a collection of over 350,000 volumes of books, periodicals, government docu-



ments, and other library materials in an open-stack arrangement. A total of approximately 500,000 volumes are owned altogether by Texas A&M University.

The library is a federal depository for United States government documents on a selective basis. Approximately 6,000 serials are currently received, along with over 50 state, national, and foreign newspapers. Special attention has been given to obtaining important foreign language periodicals in all areas. Although the library has been developed chiefly along reference and technical lines, its collections are being expanded to meet the University's broadened needs. Generous contributions from A&M Mothers' Clubs throughout the State have been used to increase substantially the collection of fiction and non-technical popular material. The careful selection of new books in both technical and non-technical areas keeps the collection abreast of modern thought. A well-trained staff of librarians is on duty during most of the hours the library is open.

The more important reference works, including indexing and abstracting services, are shelved in the General Reference Room, second floor. State and federal documents are to be found in the Documents Division, second floor. The library receives on deposit the unclassified reports of the Atomic Energy Commission, as well as selected technical reports of the National Aeronautics and Space Administration. Microfilm, microcard, and microfiche machines are provided for reading materials available in these forms. Photocopy service is available at a nominal charge.

Individual study carrels are provided in the bookstacks for the use of graduate students and faculty members. With the exception of periodicals, government documents, and certain books temporarily reserved by departments for reference or required reading, most books are loaned for home use for a period of one month. Bound periodicals are loaned for outside use on a one-week charge only to faculty and staff. Unbound periodicals are not checked out for circulation.

**Engineering Library:** Formerly the Texas Engineers Library, this branch library was established in 1941 by the Texas State Board of Registration for Professional Engineers in cooperation with the Agricultural and Mechanical College of Texas. It is now housed in Bagley Hall adjacent to the main university library. The collection consists of over 95,000 volumes of books, periodicals, and other library materials in all areas of engineering. The collection is well balanced but is especially strong in aeronautics, air-conditioning, highway engineering, concrete, hydrology, sanitary engineering, petroleum, and welding. Over 1,500 periodicals and other serials are currently received, including many in foreign languages and some English translations of Soviet technical journals.

**Veterinary Library:** This branch library is located in the Veterinary Medicine Building and is primarily a reference library with over 12,000 volumes of books and periodicals in the fields covered by the curriculum in the College of Veterinary Medicine. The library subscribes to approximately 450 American and foreign periodicals and receives pertinent publications from other colleges and experiment stations.

**Architecture Library:** This branch library, located in the new Architecture Building, furnishes reading room space and offers reference service. The collection, numbering approximately 7,000 volumes of selected books and periodicals, provides materials in this specialized field for both students and faculty.

**Business Administration Library:** Another branch of the University Library, this collection consists of approximately 8,000 volumes of books and periodicals in the many areas of business administration, such as accounting, insurance, marketing, business law. Over 170 periodicals are currently received and a file of annual reports of corporations is maintained. The library is located in Francis Hall.

**Chemistry Library:** This newest branch library, housed in the Chemistry Building, consists of a collection of over 4,000 volumes of books and periodicals which have been selected for their value as reference material for chemistry.

**Other Libraries:** Many departments maintain working collections of books and periodicals for use within the departments. Some of the collections are fairly large and well organized; others are small but well chosen. Use of these libraries is controlled by the departments concerned.

## THE SUMMER SESSION

Texas A&M University conducts a summer session consisting of two terms of six weeks each for the benefit of both graduate and undergraduate students.

During the summer session courses are offered in most of the departments and are selected to meet the needs of the regular university students. Emphasis is also placed on planning a program for teachers and administrators who wish to do advanced work. A number of departments offer sufficient work for the Master's degree to be earned by attendance during the summer months. Instruction during the summer session is given by members of the Texas A&M University faculty and by teachers of prominence from other institutions.

A separate catalogue for the summer session giving course offerings and other pertinent information is published each spring and is available on request from the Office of the Director of Admissions.

See the section on the Texas Maritime Academy for information on the Summer Cruise of the T. S. Texas Clipper.

## ADMISSION

### APPLICATION FOR ADMISSION

Any person who desires to apply for admission to the University should write to the Director of Admissions, Texas A&M University, College Station, Texas, for a formal application blank. The applicant should complete the form according to the directions printed thereon and return it to the Admissions Office. If the applicant has attended any other college or university, he must submit a complete, official, and original transcript from each institution previously attended. In such a case, the college transcript will serve in lieu of the high school transcript required of those who have had high school attendance only. It is extremely important that these credentials be submitted in advance of registration. If this cannot be done, the applicant should bring them at the opening of the session. Without the credentials the applicant cannot be admitted, and valuable time will be lost if he has to send for them after arriving at the University.

When admission requirements have been satisfied, the Director of Admissions will then send the applicant a letter of acceptance, a room reservation card, and a physical examination form to be filled out by a physician. The physical examination report must be completed and returned to the Admissions Office prior to the date of registration for classes.

All applicants for admission to the University must be of good moral character, at least sixteen\* years old, and free from contagious or infectious diseases.

In addition to the normal requirements for admission, a student seeking to enroll in the Texas Maritime Academy must satisfy the following requirements:

1. He must be a citizen of the United States.
2. He must be unmarried. (Regulations require that the Maritime Cadet remain unmarried until graduation.)

A high school student who is eligible for admission to the University and who wishes to enter during the summer may well consider the opportunities of combining study and recreation at the Junction Adjunct of Texas A&M University. Excellent studying, living, and recreational facilities are available at this beautiful Kimble County campsite in the heart of the Texas hill country. Application blanks for admission to the Adjunct may be obtained from the Director of Admissions, Texas A&M University, College Station, Texas.

### HIGH SCHOOL UNIT REQUIREMENTS

An applicant must have graduated from a properly accredited secondary school with a minimum of sixteen units (credits) which are acceptable to the University for entrance purposes. Those with superior high school records but who have unit deficiencies will be considered on the basis of their merit. Other applicants who do not present the units required for admission may meet requirements on the basis of a satisfactory showing on their College Entrance Examination Board tests.

\*Texas Maritime Academy students must be at least 17 and not more than 22 years of age on the day of registration.



The sixteen acceptable entrance credits required of all students (with exceptions indicated where applicable) shall be distributed as follows:

Subject	Units of Credit Required	Remarks
English	4	Required of all students. Two units in a single foreign language may be substituted for 1 unit in English.
Social Science	2½	Required of all students.
Mathematics:		
Algebra	2	Required of all students.
Plane Geometry	1	Required of all students.
Trigonometry	½	Required of all students except applicants for liberal arts and teacher education programs, who may substitute ½ unit from the electives below.
Science	2	Required of all students. It is preferred that these 2 units include biology, chemistry, or physics.
Electives	4	Recommended from the following subject areas: foreign languages, mathematics, science, social science, speech. Not more than 3 vocational units may be submitted as electives. Applicants for admission to engineering, mathematics, pre-veterinary medicine, and science are strongly advised to include at least ½ unit elective in advanced mathematics.
Total	16	

### TESTS REQUIRED OF NEW STUDENTS

Texas A&M University requires certain College Entrance Examination Board (CEEb) tests as a part of its admission procedures for those applicants seeking admission to their first semester of college or university work. Results of these tests are to be used for admission, counseling, and placement purposes. The following tests will be required: Scholastic Aptitude Test (SAT), English Composition Achievement Test, Mathematics Achievement Test (Standard or Intensive). The College Entrance Examination Board offers these examinations at conveniently located testing centers throughout the United States and in major cities of many foreign countries. Testing dates, locations, and fees required are described in an information bulletin which may be obtained by writing to the College Entrance Examination Board, Box 592, Princeton, New Jersey.

The minimum test score requirements for admission for applicants who have never attended another college or university are stated in terms of a total score on the College Entrance Examination Board's Scholastic Aptitude Test. This total score is the sum of the Verbal and Mathematical scores reported by the College Board. The following test score requirements for the Scholastic Aptitude Test are effective for entering freshmen.

Standing in High School Graduating Class	Minimum Total Score Acceptable for Admission
Highest Quarter	700
Second Quarter	775
Third Quarter	850
Fourth Quarter	925

### ADMISSION BY EXAMINATION

Any or all of the scholarship requirements for admission may be met by passing the entrance examinations. These will be held at the beginning of each semester under the supervision of the University authorities and will cover all the subjects required or accepted for admission as outlined above. Candidates desiring to take examinations at the University should notify the Director of Admissions well in advance of registration.

### ADMISSION BY INDIVIDUAL APPROVAL

An applicant over twenty-one years of age who has not recently attended school and who cannot satisfy the entrance requirements in full may be admitted without examination, subject to the following requirements:

1. He must make application on the official entrance blanks.
2. He must furnish evidence that his preparation is substantially equivalent to that required of other applicants and that he possesses the ability and seriousness of purpose necessary to pursue his studies with profit to himself and to the satisfaction of the University.

### ADMISSION OF TRANSFER STUDENTS

Admission to advanced standing may be granted to an applicant who has satisfied the requirements as outlined below:

An applicant who has attended another college or university must be eligible to return to that institution and also must have for each of the last two semesters, or for the total record if less than two semesters of attendance, a grade point ratio of 1.00 (C-average) or better on all courses undertaken.

An official transcript of the record at each college or university previously attended must be submitted.

An applicant is not at liberty to disregard the record of any previous training and gain admission by individual approval or on the basis of a high school record.

On the basis of these credentials, credit will be given for work completed with a grade of C or better, so far as the work is equivalent in character and extent to similar work at Texas A&M University. Credits given by transfer are provisional and may be cancelled at any time if the student's work in the University is unsatisfactory. Work completed with a grade of D must be validated before it can be transferred. Validation may be by examination or by completion with a grade of C or better of more advanced work in the subject area.

It is essential that all credentials be forwarded to the Director of Admissions well in advance of registration day.

### ADMISSION OF SPECIAL STUDENTS

A limited number of students over twenty-one years of age may be admitted to the University as special students, not candidates for a degree, subject to the following regulations:

1. The applicant must show good reason for not taking a regular course and must submit satisfactory evidence that he is prepared to profit by the special studies he wishes to pursue.
2. Record of his previous scholastic work must be submitted on the official entrance blanks and must be accompanied by a statement showing (1) his experience; (2) a plan of study, enumerating the courses he desires to pursue; and (3) the purpose or end expected to be accomplished by his study.

### ADMISSION OF NONRESIDENT STUDENTS

A limited number of nonresident students who have attended another college or university may be accepted so long as facilities are available. Such students must have maintained a grade point ratio of 1.00 (C-average) or better on all courses undertaken in addition to a grade point ratio of 1.00 (C-average) or better for each of the last two semesters.

A limited number of out-of-state high school graduates may be accepted so long as facilities are available. Such students, in addition to satisfying all other admission requirements, must have made superior records in high school.

Students who are admitted to the University in one curriculum may not be permitted to change to another which is restricted except under the same conditions as apply to new students.



The status of the residence of a student is determined at the time of his first registration in the University, and his residence is not changed by his sojourn at Texas A&M as a student. His residence may not thereafter be changed by him, but, in the case of a minor, it may be changed by his parents, should they move to and become legal residents of the State and maintain such residence for at least one calendar year.

## REGISTRATION

Every student is required to register when he first enters the University and thereafter at the beginning of each semester. Dates of registration for the session of 1966-67 are shown on pages 2-3 of this catalogue.

Registration is not complete until the student pays his fees for the ensuing semester; reports, if not a civilian student, to ROTC headquarters for assignment to an organization; reports to the Housing Manager for assignment to a room or to report his place of residence if not living in a dormitory; and returns his assignment card, properly approved, to the Registrar's Office, where his receipt showing payment of fees will be stamped "Registered in the Registrar's Office."

## EXPENSES

The expenses for a regular session of nine months will vary with the individual concerned and with the course of study pursued. In the case of new students the total cost should range between \$950.00 and \$1,250.00. In general these amounts include four types of expenses: fees payable to the University Fiscal Department; textbooks and supplies; clothing, and military uniform to supplement that furnished by the University; and incidental expenses, estimated to range between \$100.00 and \$200.00 depending upon the individual concerned. Nonresident students should increase these estimated expenses by \$300.00 to cover the nonresident tuition fee.

The total expenses for returning students during a regular session should be somewhat less than those amounts indicated for new students.

The professional College of Veterinary Medicine will be on the trimester program, and expenses for these periods are shown on the following pages.

## PAYMENTS

Payments to the Fiscal Department may be made by cashier's check, personal check, or money order, payable to Texas A&M University. All checks, money orders, and drafts are accepted subject to final payment.

## FEES

The fees set out herein for the session of 1966-67 are strictly approximations and are subject to change because of economic conditions and/or legislative requirements. The fees listed below are for all students except those in the professional College of Veterinary Medicine.

FULL SEMESTER	FALL 1966	SPRING 1967
Tuition	\$50.00*	\$ 50.00*
Student Services	18.00	18.00
Building Use Fee	16.00	16.00
Property Deposit	10.00	—
Student Activities	25.30	—
Board Including Tax	180.00	180.00
Room Rent (non-air-conditioned) and Laundry	107.00	107.00
Room Deposit	20.00	—
Identification Card	1.00	—
<b>TOTAL</b>	<b>\$427.30</b>	<b>\$371.00</b>
Air-Conditioned Room, additional charge	45.00	45.00
<b>TOTAL</b>	<b>\$472.30</b>	<b>\$416.00</b>

Board may be paid in three installments of \$61.00 each with a service charge of \$3.00.

\*The tuition fee for nonresident students is \$200.00 per semester.

The estimated fees for students in the professional College of Veterinary Medicine are shown below:

FULL TRIMESTER	FIRST TRIMESTER	SECOND TRIMESTER	THIRD TRIMESTER
Tuition	\$ 50.00*	\$ 50.00*	\$ 50.00*
Student Services	18.00	18.00	18.00
Building Use Fee	16.00	16.00	16.00
Property Deposit	10.00	—	—
Student Activities	25.30	—	—
Board Including Tax	159.00	159.00	53.00**
Room Rent (non air-conditioned) & Laundry	95.00	95.00	95.00
Room Deposit	20.00	—	—
Identification Card	1.00	—	—
<b>TOTAL</b>	<b>\$394.30</b>	<b>\$338.00</b>	<b>\$232.00</b>
Air-Conditioned Room, additional charge	40.00	40.00	40.00
<b>TOTAL</b>	<b>\$434.30</b>	<b>\$378.00</b>	<b>\$272.00</b>

Board may be paid in three installments of \$54.00 each with a service charge of \$3.00.

For additional information concerning expenses for students in the Texas Maritime Academy, see the Texas Maritime Academy section of the catalogue. All fees are payable in full at the beginning of the semester except board, which may be paid by installments. A \$1.00 service charge for each installment will be assessed. A \$1.00 charge per day, with a maximum of \$5.00, will be made on installment payments made after the due date. Students who are delinquent with installment payments for five days will be dropped from the rolls of the University.

## EXPLANATION OF FEES

### Tuition

The tuition fee, fixed by State law, is \$50.00 per semester for the Texas resident and \$200.00 per semester for the non-Texas resident. Payment of this fee entitles the student to register for 12 or more semester hours.

Former students who in either semester do not register on the days set apart for that purpose pay an additional fee of \$4.00.

The fee for courses audited or visited by students shall be the same as for courses for which credit is given.

### Student Services

The student services fee is required of all students but the amount varies with the student's load. Students registered for 7 or more semester hours pay \$18.00; students registered for 6 or less semester hours pay \$6.00. This fee covers the services at the University Hospital, the Memorial Student Center, the intramural program, and the student aid program; however, the full services of the University Hospital will not be available to those students paying service fees of only \$6.00 unless they elect to pay the full fee of \$18.00. Surgical operations and charges for consultations with outside physicians requested by parents are not included. The services of the University Hospital do not include the physical examination required of entering students.

### Property Deposit

The property deposit of \$10.00 is charged to insure against loss by damage, breakage, etc. It is to be paid by all students and is refundable when graduating or leaving the University.

### Student Activities

The student activities fee is optional. It entitles the student to receive the *Battalion* newspaper, the University yearbook, and the magazine published by the college in which the student is registered. It also entitles him to admission to all intercollegiate athletic events played at the University under the auspices of the Athletic Department, to the Town Hall programs, and to the Great Issues series.

\*The tuition fee for nonresident students is \$200.00 per semester.

\*\*This payment is for board through May 27. During the summer months students board at the University Cafeteria, and payment is not made in advance.



For students who do not pay this optional fee for the fall semester, the spring semester activities fee will be \$14.05.

### **Board**

All students living in the dormitories are required to pay for board, room rent, and laundry. Changes from dormitory student to day student will be made only on the last day of installment payments for board.

### **Room Rent and Laundry**

The total amount of room rent and laundry for the semester must be paid at the time of registration. This charge for room rent includes heat, light, and cleaning the corridors but not the rooms. Air-conditioned rooms are available at higher rates.

Rooms are furnished with single bedsteads, mattresses, desks, chairs, and dressers. Students are expected to furnish their own pillows, bedding, and linens.

### **Room Deposit**

The room deposit of \$20.00 must be paid by all students who will reside in the University dormitories before a room reservation or assignment can be made; this amount will be retained as a deposit against damage and breakage. The deposit may be refunded upon request prior to August 15 for the fall semester and January 15 for the spring semester for those students not planning to enroll. Students in the professional College of Veterinary Medicine who decide not to enroll must request their refunds for room reservations by August 15 for the first trimester, December 5 for the second trimester, and by March 5 for the third trimester. Refunds may be made in accordance with the University policy for those students graduating or withdrawing from school after clearance by the Office of Student Affairs.

### **Identification Card**

All students must have an identification card. This card is used in registration procedures, collection of fees, cashing of checks, laundry service, for dining hall privileges, etc.

### **Laboratory Fees**

A laboratory fee ranging in amount from \$2.00 to \$8.00 is charged for each laboratory course each semester.

### **ROTC Uniform Handling**

Students enrolled in military, air, or naval science are required to pay a uniform handling charge of \$8.00.

### **Physical Education Service**

The University will furnish the necessary physical education uniform, except shoes, to all students taking required physical education and to others who wish to use facilities of the Physical Education Department. All such students will be required to pay a handling charge of \$8.00 per semester for this service. The handling charge includes the cost of laundering the physical education uniform after each use. This amount also covers the cost of bowling, swimming, and golf for those students enrolled in these physical education courses.

### **Parking Permit**

All students driving motor vehicles on the campus must pay a fee of \$3.00 per semester for registration and parking.

## **OTHER EXPENSES**

**Textbooks and Supplies:** The cost of textbooks and supplies will vary with the quality of items purchased and with the course of study to be pursued. Engineering students can expect to pay an amount ranging between \$80.00 and \$120.00; other students will probably pay from \$40.00 to \$60.00. These amounts are estimates for the combined fall and spring semesters.

**Uniforms:** Cadets enrolled in Army or Air Force ROTC will be furnished the basic cadet uniforms. Cadets who are not enrolled in ROTC (drills and ceremonies cadets) are required to pay \$50.00 per year for use of the issued cadet uniform. All cadets will find it necessary to supplement the uniform issued by purchases that will have a total value of approximately \$40.00 at the University Exchange

Store. Since only approved articles of uniform may be worn, new students should purchase the additional items of uniform after arrival at the University.

Cadets will pay a handling charge of \$8.00 per year to cover the cost of issuing, receiving, and record keeping of the uniforms issued.

To defray the cost of additional billing and delayed handling, a charge of ten percent of the value of the uniform articles turned in subsequent to five days following the close of school, with a minimum charge of \$1.00 will be made.

**Other Items:** The University operates a store for the purpose of supplying necessary articles to students. The store carries in stock textbooks, stationery, drawing instruments, toilet articles, and other supplies. All merchandise is sold at the usual retail prices prevailing in the area. Upon recommendation of the Exchange Store Advisory Board, any profit created from the operations of the Exchange Store may be used for student welfare and other purposes of benefit to the student body.

### AUDITING OR VISITING FEE

The fee for courses audited or visited by students shall be the same as for courses for which credit is given.

### REFUNDS

Any student withdrawing officially (a) during the first week of class work in a semester or trimester will receive a refund of four-fifths of the tuition fee; (b) during the second week of class work, three-fifths; (c) during the third week of class work, two-fifths; (d) during the fourth week of class work, one-fifth; (e) after the fourth week of class work, nothing. No refunds will be made until ten days have elapsed from the time the fees were paid.

Students withdrawing from a laboratory course during the first week of class work in a semester or trimester will receive a refund of 100% of the laboratory fee paid. Students withdrawing from a laboratory course after the first week of class work in a semester or trimester shall not be entitled to a refund.

Students withdrawing officially from school during the first week of a semester or trimester will receive a refund of 100% of the Student Services and Physical Education Service fees. A student withdrawing after the first week in a semester or trimester will receive no refund.

A refund of board and laundry payment will not be made unless there is a consecutive absence of not less than ten days due to illness of the student or a member of his family, or for some other unavoidable cause. Laundry refunds are computed on a weekly basis.

There will be no refund of room rent after classes start.

Students withdrawing during the first week of the fall semester or first trimester will receive a 100% refund of the Student Activities fee. Students withdrawing after the first week of the fall semester or first trimester and before the end of the first week of the spring semester or second trimester will receive a refund of \$6.55 and will be entitled to receive a copy of the student annual. Students withdrawing after the first week of the spring semester or second trimester will receive no refund.

Students not enrolled in the fall semester or first trimester and withdrawing during the first week of the spring semester or second trimester will receive a 100% refund of the Student Activities fee. No refund will be made to students withdrawing after the first week, but the student will be entitled to receive a copy of the student annual.

### REDUCTIONS

No reductions will be made in charges for board, room rent, or laundry in case of entrance within ten days after the opening of a semester or trimester, nor will a refund be made in case of withdrawal during the last ten days of a semester or trimester or the last ten days for which payment is made.

### UNPAID CHECKS

If a check or draft accepted by the Fiscal Department is returned unpaid by the bank on which it is drawn, the person presenting it will be required to pay a penalty of \$2.00.



## DUPLICATE RECEIPTS

Duplicate receipts for fees paid by students will be issued on payment of twenty-five cents.

## DAY STUDENTS

Day students pay all specified fees and charges except board (optional), laundry, and room rent.

## PART-TIME STUDENTS

The tuition fee for students registering for less than 12 credit hours will be reduced by \$4.00 for each credit hour less than 12 with a minimum tuition fee of \$15.00.

## NONRESIDENT STUDENTS

In accordance with the regulations of the governing board of the University, the following definitions, general policies, and regulations will apply to nonresident students. Any variance therefrom will depend upon the facts in the individual case and the interpretations placed thereon by the admissions officer.

The residence status of a student is determined at the time of his first registration in the University, and his residence is not changed by his sojourn at Texas A&M University as a student except as provided by law. This policy shall apply to both graduate and undergraduate students regardless of any scholarships, student assistantships, or graduate assistantships that may be granted to any student.

In compliance with the State law, the tuition fee for nonresident students is \$200.00 per semester. A nonresident student is hereby defined to be a student of less than twenty-one years of age, living away from his family and whose family resides in another state, or whose family has not resided in Texas for the twelve months immediately preceding the date of registration; or a student of twenty-one years of age or over, who resides out of the State or who has not been a resident of the State twelve months subsequent to his twenty-first birthday or for the twelve months immediately preceding the date of registration. The tuition fee for nonresident students registering for less than 12 credit hours will be reduced by \$16.00 for each credit hour less than 12.

The term "residence" as used herein means "domicile" and the term "resided in" means "domiciled in."

The legal residence of one who is under twenty-one years of age is that of the father. Upon death of the father, the legal residence of the minor is that of the mother. Upon divorce of the parents, the residence of the minor is determined by the legal residence of the person to whom custody is granted by the court. In the absence of any grant of custody, the residence of the father continues to control. Upon death of both parents, the legal residence of the minor continues to be that of the last surviving parent until he becomes twenty-one unless he makes his home with his grandparents, whereupon their residence is controlling.

Individuals who have come from without the state of Texas and who register in an educational institution of the State prior to having resided in the State for a period of twelve months shall be classified as nonresident student; and such nonresident student classification shall be presumed to be correct as long as the residence of such individuals in the State is during their attendance at educational institutions, regardless of whether such individuals have become qualified voters, have registered motor vehicles and paid personal property taxes thereon, have obtained Texas drivers' licences, or have otherwise attempted to establish legal residence within the State.

A student under twenty-one years of age shall not be classified as a resident student until his parents shall have maintained legal residence ("domicile") in this state for at least twelve months. A student under twenty-one years of age whose parents leave the State to reside in another state normally shall be classified immediately as a nonresident student. It shall be the responsibility and duty of the student to submit legal evidence of any change of residence.

Individuals of twenty-one years of age or less whose families have not resided in Texas for the twelve months immediately preceding the date of registration shall be classified as nonresident students regardless of whether such individuals have become the legal wards of residents of Texas or have been adopted by residents of Texas while

such individuals are attending educational institutions in Texas or within a year prior to such an attendance or under circumstances indicating that such guardianship or adoption was for the purpose of obtaining status as a resident student.

All individuals who have come from without the state of Texas and who are within the State primarily for educational purposes are classified as nonresidents. Registration in an educational institution in the State is evidence that residence is primarily for educational purposes even though such individuals may have become qualified voters, have become legal wards of residents of Texas, have been adopted by residents of Texas, or have otherwise attempted to establish legal residence within the State.

A student twenty-one years of age or older who comes from without the State and desires to establish a status as a resident student must have resided in the State as a legal resident for a period of at least twelve months and must have the intention of establishing a permanent residence within the State during that entire period.

All aliens shall be classified as nonresident students except that an alien who has applied for naturalization in the United States and has received his first citizenship papers or immigrant cards shall have the same privilege of qualifying as a resident student as a citizen of the United States. The twelve months' residence required to establish the status of a resident student shall not begin until after such first citizenship papers or immigrant cards have been received by the alien.

Officers, enlisted personnel, selectees or draftees of Army, Army Reserve, National Guard, Air Force, Air Force Reserve, Navy, Naval Reserve, or the Marine Corps of the United States who are stationed in Texas by assignment to duty within the borders of this state, shall be permitted to enroll themselves, their husband or wife as the case may be, and their children by paying the tuition fees and other fees or charges provided for regular residents of the state of Texas, without regard to the length of time such officers, enlisted personnel, selectees, or draftees have been stationed on active duty within the State. This provision shall extend only during active military service in Texas; and upon such member of the Armed Services being transferred outside the state of Texas, he and his children shall be classified as to residence under the second paragraph of these regulations. Any student claiming the privilege of this section shall submit at each registration a statement by the commanding officer of the post or station at which he or his parent is on active duty verifying the fact of his or his parent's military status.

The residence of a wife is that of her husband; therefore a woman resident of Texas who marries a nonresident shall be classified as a nonresident and shall pay the non-resident fee for registration subsequent to her marriage. A nonresident woman student who marries a resident of Texas is entitled to be classified immediately as a resident student and is entitled to pay the resident fee for all subsequent registrations.

It shall be the responsibility of the student to pay the correct fee at the beginning of each semester or term for which he may register, and a penalty of \$10.00 shall be assessed for failure to pay the proper fee.

#### VOCATIONAL REHABILITATION AID

The Texas Education Agency, through the Vocational Rehabilitation Program, offers assistance for tuition and required fees to certain students in Texas colleges and universities. Eligibility for such assistance is based on permanent physical disabilities and other chronic conditions.

Application should be made to the Texas Education Agency, Division of Vocational Rehabilitation, Room 505, Varisco Building, Bryan, Texas, or to Doyle Wheeler, Director, Division of Vocational Rehabilitation, Capitol Station, Austin 11, Texas.

### SCHOLARSHIPS, FELLOWSHIPS, AND AWARDS

The University scholarship program is administered by a Faculty Scholarships Committee. As authorized by the Board of Directors, this committee is composed of the Dean of Academic Administration, who serves as chairman; the Secretary of the Former Students Association; and a representative, appointed by the President, from the Counseling and Testing Center and from each of the undergraduate colleges of the University.



In general there are three types of grants-in-aid available: (1) Valedictory Scholarships and Opportunity Awards, representing those limited to entering freshmen; (2) scholarships designed for the more advanced undergraduate students, and (3) fellowships for graduate students.

The over-all program is designed to encourage and reward scholastic effort on the part of all students; to enable outstanding students to do the best work of which they are capable by removing financial handicaps; and to enable capable and ambitious young men who might be denied an education for financial reasons only to secure that education at Texas A&M University.

### Valedictory Scholarships

A scholarship is offered to the valedictorian who graduates from a secondary school accredited by the Texas Education Agency and who qualifies for admission to the University. The successful applicant must make the highest record among all students, boys and girls, graduating that calendar year, including winter, spring, and summer graduating classes, and must be certified to the University through the Texas Education Agency.

On all valedictory scholarships awarded prior to May 26, 1965, the financial benefit was exemption from payment of tuition fees (\$25.00 for each six weeks term of the summer session, and \$50.00 each semester of the long session, not to exceed a grand total of \$400.00) and laboratory fees for a period equivalent to four academic years (eight semesters) under the following terms and conditions:

1. The student's initial enrollment must have been in this University.
2. To be eligible for the award any semester or summer term, the student must schedule at least 15 hours in a semester of the long session or 6 hours in a six-week term of the summer session.
3. On such a schedule the student must make a grade point ratio of at least 1.00 each semester during the first year in the University to be eligible for the award the succeeding year. After his first year, he must make a grade point ratio of at least 2.00 each semester to be eligible to use the scholarship in succeeding periods of enrollment.
4. The student's eligibility for any part of the scholarship shall not extend beyond the end of four calendar years from the time of high school graduation.
5. The conduct of the scholarship holder must be satisfactory to the faculty.
6. The student must be a legal resident of the State of Texas for school purposes.
7. Any student who may have lost his scholarship for academic reasons may have it reactivated on the basis of his performance during any twelve-week summer session or long session semester.

All valedictory scholarships awarded on or after May 26, 1965, will be issued to the highest ranking graduate of each accredited high school of this State, exempting said graduates from the payment of tuition during both semesters of the first long session immediately following their graduation; provided, that when in the opinion of the President the circumstances of an individual case (usually military service) merit such action this exemption may be granted for one of the first four long sessions following that individual's graduation from high school. The following terms and conditions must be met by the holders of these awards:

1. The student's initial enrollment must be in this University.
2. To be eligible a student must enroll for 15 hours in each long semester of his freshman year.
3. On such a schedule the student must make a grade point ratio of at least 1.00 during the first semester to be eligible to use the scholarship during the next semester.
4. The conduct of the scholarship holder must be satisfactory to the faculty.
5. The recipient must be a legal resident of the State of Texas for school purposes.

### **The Opportunity Award Program:**

This program annually provides approximately 100 four-year scholarships to high school graduates of Texas who are capable of outstanding scholastic achievement and who need financial assistance to attend the University. The awards are made possible through the Association of Former Students, the Texas A&M University Development Fund, and by interested citizens and organizations of the State. Financial benefits range in value from \$800 to \$1600 with recipients receiving from \$200 to \$400 each year for four years plus an opportunity for additional earnings from student employment if necessary. Most of the awards are unrestricted as to course of study or degree objective in the University.

Graduates of accredited high schools of Texas who have not attended another college or university, who are single, legal residents of this state, and who need financial assistance to attend the University are eligible to make application for an Opportunity Award Scholarship. To be considered for such a scholarship, an applicant must satisfy the admission requirements of the University, must make formal application for an award on forms provided by the University; must submit a Parent's Confidential Statement form to the College Scholarship Service, P. O. Box 176, Princeton, New Jersey 08540 or P. O. Box 1025, Berkeley, California 94701; and must enter the state-wide competition which is held each spring. Selections are made by the Faculty Scholarships Committee on the basis of the applicant's academic record in high school; his scores on the College Entrance Examination Board tests; his evidence of initiative, leadership, and other traits of good character; and his need for financial assistance. The required C.E.E.B. tests are as follows: (a) Scholastic Aptitude Test, (b) Achievement Test in English Composition, and (c) Achievement Test in Mathematics (intermediate or advanced). In order for the award to be continued from semester to semester, the recipient must maintain a standard of scholastic achievement and personal conduct satisfactory to the Scholarships Committee.

This program is usually announced officially during the latter part of the fall semester each year. Official announcements and application blanks are distributed to each accredited high school throughout the State at that time and are also made available to those interested upon request. Requests for additional information and application forms should be addressed to the Secretary, Faculty Scholarships Committee, Texas A&M University, College Station, Texas 77843.

### **Scholarships for Advanced Undergraduate Students:**

One-year scholarships ranging in value from \$100 to \$750 are available to outstanding students already enrolled in the University. Some of these awards are limited to certain fields of study and to individuals who have attained a necessary academic classification, while others are unrestricted. Recipients are chosen by the Faculty Scholarships Committee in May each year with the basis of selection determined by the nature and intent of the award.

Some of these scholarships are given as "rewards for a job well done" and are intended to recognize outstanding scholastic achievement or other meritorious accomplishments. As such, they not only benefit financially the student concerned but also encourage and promote scholastic attainment and leadership on the part of other individuals. In addition to the reward type of scholarship, others are made available to outstanding students who must have financial assistance in order to remain in college. It is the general objective of this type of award to encourage every scholar to go as far as his abilities and ambition will carry him.

Information regarding scholarships for advanced undergraduate students may be obtained from the Secretary, Faculty Scholarships Committee, Texas A&M University. College Scholarship Service:

Texas A&M University participates in the College Scholarship Service (CSS) of the College Entrance Examination Board. Participants in the CSS subscribe to the principle that the amount of financial aid granted a student should be based upon financial need. The CSS assists colleges and universities in determining the student's need for financial assistance. All applicants for an Opportunity Award Scholarship must submit a copy of the Parent's Confidential Statement (PCS) form to the College Scholarship Service, designating Texas A&M University as one of the recipients, by March 31 each year. The PCS form may be obtained from a local high school or the College Scholarship Service, P. O. Box 176, Princeton, New Jersey 08540 or P. O. Box 1025, Berkeley, California 94701.



## STUDENT LIFE

### LEADERSHIP AND GUIDANCE

Leadership and guidance in the area of student life are the responsibilities of the Dean of Students. Responsibility for the enforcement of University regulations lies with the Director of Student Affairs for civilian students and with the Commandant of Cadets for military students. Appeals by civilians may be made to the Director of Student Affairs and by military students to the Commandant.

The student government of the University is carried out through the Student Senate. The office of the Advisor of the Student Senate is the Dean of Student's Office, YMCA Building.

The Civilian Student Council serves as the official governing body for civilian students, with responsibility in those areas affecting civilian students only. The Council is advised by the Department of Student Affairs.

### THE OFFICE OF THE DEAN OF STUDENTS

Responsibility for the development and welfare of the student in areas other than academic is placed with the Office of the Dean of Students. Activities are provided which help to meet the physical, emotional, social, and spiritual needs of students.

Student personnel departments and offices under the direction of the Dean of Students include the following:

Commandant (Headquarters of the Corps of Cadets)

Army ROTC

Air Force ROTC

Student Affairs, Veterans Advisory Service, Foreign Student Advisor, Campus Security, Housing, and Civilian Counselors

Memorial Student Center

Placement of Graduates, Student Aid and Loan, Scholarships, and Continuing Education

Student Health Services and Campus Hospital

Y.M.C.A. and the All Faiths Chapel

### STUDENT AFFAIRS

The Department of Student Affairs includes the activities and functions of the War Orphans Advisors Office, the Housing Office, Civilian Dormitory Counselors, and the Campus Security Office.

### WAR ORPHANS ADVISORY SERVICE

Texas A&M University provides advisory service to war orphans and assists them in securing proper benefits from the Veterans Administration. This service is provided in the office of the Department of Student Affairs, Y.M.C.A. Building.

### HOUSING AND MEALS

**Single Students:** Unless they are living with their families, all students are required to live in University-owned dormitories on the campus.

Reservations are filed in the order in which they are received and will be held only until 5 p.m. of the regular registration day. Reservations made by students who do not complete their registration on the regular registration day by 5 p.m. may be canceled, and the space will be assigned to another applicant.

A new student may file a room reservation as soon as he has been accepted by the Director of Admissions and Registrar. A room reservation card will be mailed to him with his acceptance letter, and the form should be completed as directed and returned to the Fiscal Department with a check or money order for \$20.00. The \$20.00 will be deposited to the student's account, where it will remain until he moves off campus, withdraws from the University, or graduates, when it will be refunded if all of his university accounts are "clear." The Fiscal Department will send the reservation card and

receipt to the Housing Office, which will verify dormitory assignment to the student. Should a student decide that he cannot enroll at the beginning of the ensuing semester and so notify the Housing Office, the reservation will be canceled. If the cancellation is made prior to August 15th for the fall semester, January 15th for the spring semester, May 15th for the first summer term, or July 1st for the second summer term, the \$20.00 deposit will be refunded; but if the cancellation is made after these dates, the \$20.00 will be forfeited. Students in the professional College of Veterinary Medicine who decide not to enroll must request their refunds for room reservations by August 15th for the first trimester, December 5th for the second trimester, and by March 5th for the third trimester. When the student reports to the campus for registration, he will secure his room assignment and room key at the Housing Office, ground floor, YMCA Building.

Air conditioned rooms rent for \$30.00 per month per student and non air conditioned rooms rent for \$20.00 per month per student.

All students residing on the campus are normally required to take their meals in one of the two dining halls on the campus, operated by the Subsistence Department of the Business Office. Each has a seating capacity of 4,000 and furnishes the students at cost well-balanced meals prepared under the direction of experienced supervisors.

**Married Students:** The University has apartments for married students, consisting of 353 furnished two-bedroom apartments, 312 furnished one-bedroom apartments, and 113 unfurnished two-bedroom apartments. More complete information and application forms may be obtained from the Housing Office, ground floor, YMCA Building.

#### FOREIGN STUDENT ADVISOR

The Office of the Foreign Student Advisor is located in Room 1-A, Puryear Hall. Information relative to immigration regulations and assistance with problems peculiar to students from other lands may be obtained from this staff member.

#### REGISTRATION OF MOTOR VEHICLES

All student and employees who drive motor vehicles on the campus must have them registered in the Office of Campus Security, YMCA Building within 48 hours of the time that they are brought on the campus.

Students are assigned parking areas according to their housing assignment. Cars must be parked in these designated areas during the regular classroom hours.

#### MEMORIAL STUDENT CENTER STUDENT PROGRAMS

Dedicated to the memory of the men of Texas A&M University who gave their lives during World Wars I and II, the Memorial Student Center was erected to foster the social, cultural, and recreational phases of student life.

General facilities of the Memorial Student Center include a dining room, cafeteria, snack bar, gift shop, telephone and telegraph center, barber shop, 66 guest rooms, travel agency, check cashing and information center, student organizations banking center, and United States Post Office. Recreational facilities include bowling lanes, table tennis and billiards area, game room, browsing library, piano room, music practice rooms, ballroom, and record playing room. A large number of meetings, receptions, exhibits, and social affairs given by the student and staff organizations of the University are held at the Center.

Included in a special activities program of the Memorial Student Center Directorate are the following special interest committees: Music, Talent, Dance, Radio, Camera, Contemporary Arts Committee, Travel, Leadership Training Program, Great Issues, Flying Kadets, Bowling, Billiards, Table Tennis, Chess, Public Relations, Personnel, Town Hall, and the Student Conference on National Affairs. These activities are governed by the Memorial Student Center Council, composed of nine students, five faculty members, and two former students, with a student as president of the Council. The Directorate, which is composed of the various committees, plans and directs the entire program. Many positions of leadership are open in this student program for those who join the committee activities at an early date.

The Memorial Student Center Student Program Staff is charged with counseling and fiscal operation of many campus student activities. It helps to sponsor cultural, recreational, and entertainment activities on the campus, including the campus movie



program, music activities, social activities; serves as banker for all recognized student organizations (approximately 325); is the agency of the University to officially recognize student organizations; and serves as financial advisor, "Club Aid" for departmental student organizations, student government, and other co-curricular activities.

The Memorial Student Center Building Cashier provides banking service for the numerous student organizations on the campus and for the Memorial Student Center businesses. The Cashier's window is also headquarters for the sale of tickets for class dances, military organization balls, and for graduation announcements.

**Clubs:** Many opportunities exist for students interested in co-curricular club activities. There are more than 300 organizations on the campus, ranging in interest from hometown clubs to technical societies. Their activities include discussion meetings, movies, smokers, barbecues, dances, and inspection trips.

**Dances and Social Affairs:** Social life at Texas A&M University is highlighted by numerous dances and social functions. The various classes, military units, and civilian organizations sponsor dances. In addition, certain all-school social functions are held for which outstanding name bands provide music. The most elaborate function is the traditional Senior Ring Dance and Banquet, when graduating seniors and their guests dance to an outstanding orchestra of the year. All parties and other social functions, whether held on or off the campus, must be approved by the University.

**Town Hall:** The Town Hall series includes the best obtainable artists in the fields of music, dance, and theater. Activity fees and the sales of season and individual tickets make it possible to bring these outstanding programs to the student body at low prices.

**Singing Cadets:** This widely known singing unit consists of more than sixty students, both civilian and military. The group has appeared in many southwestern cities and in Mexico, on numerous broadcasts and telecasts, and on various other entertainment programs. For the past few years this group has served as the official glee club for the coast-to-coast television program "Miss Teen-Age America." Membership is selected from the entire student body by auditions held early in the fall semester.

**Dance Band:** The Aggieland Dance Band is made up of both civilian and military students. Each year the band plays for various dances and shows on and off the campus. Dance tours are made throughout the State to play for A&M Club dances. Members are chosen by competitive audition at the beginning of the fall semester. Rehearsals are held once a week.

**Music Practice Rooms:** For students interested in music, an area in the lower level of the Memorial Student Center with four practice rooms and pianos is provided. It is open for use from 8 a.m. to 10 p.m., and may be used by special appointment obtained at the main desk of the Center for instrumental or vocal groups.

**Guion Hall:** This auditorium is used for class meetings, faculty and staff meetings, as a concert hall, and for dramatic presentations. The lower level contains "The Fallout Theater," an area for arena and intimate theater productions.

**The Grove:** The Grove is an outdoor concrete recreational area with a stage, utilized by the Memorial Student Center for the scheduling of movies, intramural athletics, concerts, dances, picnics, games, and festivals.

## THE AGGIE PLAYERS

This is a student organization that offers active participation in theater work for academic credit or as extracurricular activity. Six courses in theater are available: Theater Arts 378, Techniques of Acting; Theater Arts 380, History of the Theater; Theater Arts 381, Introduction to Theater; Theater Arts 382, Technical Theater; Theater Arts 383, Techniques of Directing; and Speech 407, Oral Interpretation. The Aggie Players present three to five major dramatic productions a year, and any student is invited to join.

## DEBATE ACTIVITIES

The Aggie Discussion and Debate Club is sponsored jointly by Student Activities and the Department of English. Activities include participation in several tournaments, extemporaneous speaking, and persuasive speaking. Interested students may obtain further information from the Department of English.

## STUDENT HEALTH SERVICES

The University Hospital provides infirmary space for over 100 patients, as well as a modern clinic for out patient care. The facilities include a complete physiotherapy department, modern laboratory, and a new x-ray department. The medical staff includes specialists in the fields of medicine, surgery, radiology, and ear, nose, and throat.

The Clinic is open from 8 a.m. to 5 p.m. on weekdays and from 8 a.m. to 12 noon on Saturdays. The Student Services fee provides for clinic visits, diagnostic examinations, care for acute illnesses, emergency care for accidents and 10 days of infirmary care each semester in cases requiring hospitalization. Routine medications for acute illnesses, x-rays, laboratory tests, and local ambulance service are also furnished the student without charge. A staff of registered nurses is on duty, with a staff physician on call, to care for emergency cases at any hour.

Students of the Texas Maritime Academy are provided free Public Health Service in Galveston.

All students are encouraged to take out the Accident Insurance Policy which is available at reasonable cost.

The water of the University is supplied through a University-owned water supply system and comes from four deep wells located nine miles northwest of the campus. As a part of the sanitary work carried on throughout the entire year, the University laboratories make bacteriological checks of this water supply and of the milk supply at regular intervals.

The University is particularly concerned with the maintenance of the health and physical development of its students. It provides the finest outdoor and indoor swimming pools in the State, as well as tennis courts, a golf course, and athletic fields. An adaptive physical education program is provided for those students needing special exercises or therapy for physical defects.

## RELIGIOUS ACTIVITIES

Texas A&M University is non-sectarian, but its high objectives cannot be achieved unless its educational program is founded on a solid religious life. Divorced from the spiritual aspirations of the individual and of the group, education cannot be complete. The basic purpose of education is a normal religious life to the end that young people may be not only more efficient but better motivated by a sense of duty and obligation. Thus, in an atmosphere of tolerance and mutual respect, every student is encouraged to maintain his ties with the religious group to which such association may be made most fruitful.

**Young Men's Christian Association:** The YMCA endeavors to develop the full, rounded man by emphasizing growth in mind, body, and spirit. Because of the effect of the YMCA on the lives of many students, it holds a coveted spot in the hearts of Aggies.

The varied and vigorous program of the YMCA depends on student participation, initiative, and leadership. The program is centered around stimulating the moral and spiritual lives of the students and includes religious discussions, Bible study, conferences, intercollegiate visits, steak fries, leadership development, Freshman Camp, United Nations Club, Preparation for Successful Marriage Forums, and many other worthwhile projects.

**All Faiths Chapel:** The beautiful All Faiths Chapel, a gift of the Former Students, is made of Austin limestone and glass, and is modern in design. In addition to providing the opportunity for individual meditation and prayer and serving as a meeting place for small religious groups, the Chapel makes available a library of religious books and affords accommodations for small weddings, funerals, memorial services, baptisms, vesper services, and other religious rites. The Chapel is open at all hours for meditation and prayer.

In addition to the on-campus University religious life, there are ten churches near the campus whose primary purpose is to serve the spiritual needs of the students. The campus religious leadership is deeply conscious that the students are in perhaps the most formative period of their lives and feel keenly the responsibility for their spiritual development.



The programs of the respective churches are aimed primarily to meet the student needs. Many of the churches have distinct student departments with specialized leadership whose sole responsibility is that of ministering to the students. The pastors of the churches also give as much time as is necessary to the students for personal counseling.

The churches serving the campus have a program similar to that of the home church with an expanded young people's department and dominant emphasis upon student interests. In addition to the special student emphasis, they have the customary Sunday worship periods, church schools, and young people's organizations promoted to stimulate clear and constructive thinking in the important field of religion. The student departments are expanded to offer wholesome recreation and social life and social service.

## CORPS ACTIVITIES

The aim of the Corps of Cadets is to offer a sound collegiate education in both mind and body under strictly military discipline. The method of administration of this military discipline and its extension to all phases of the cadet's non-academic life are distinctive at the Texas A&M University. Students are organized along military lines and observe military practices at all times. They habitually wear the prescribed uniform on the campus and live in rooms assigned to them on the basis of their military organization. From reveille to taps, every hour of the cadet's time is accounted for. The regular habits of study and living thus formed, the attention to duty, obedience to authority, and love for order inculcated are considered among the most valuable features of the military education. While some of the graduates enter the military profession, hundreds in all walks of civil life attest to the high value of the training received at this institution.

An integral part of the military system is the requirement of freshmen of certain extra duties and activities at the beginning of their University career. During the early weeks of their first year the cadets have special drills under their cadet officers and follow a rigorous program of behavior designed to improve their military posture and to inculcate early respect for upperclassmen who are their military superiors. These special activities do not interfere unduly with the freshman's academic program nor usurp his prerogatives as a private individual. They are supervised by responsible cadet officers under the general supervision of the Commandant and are to be distinguished from irresponsible hazing, which is forbidden by the rules and regulations of the University.

In keeping with the democratic ideals of the Texas A&M University, the formation of exclusive societies or fraternities, membership in which is based on other requirements than individual worth and achievement, is forbidden. When new cadets report to the University, all are at once put in uniform and, as far as possible, all artificial distinctions based on wealth, position, or influence are minimized and the cadet is encouraged to achieve his place by individual merit. All cadets live under practically identical conditions, and all are rated by the same standards, but there is a wide range of opportunity for each to develop in accordance with his needs and aptitudes.

Among Cadet Corps organizations is the Ross Volunteer Company, a military group composed of outstanding cadets. This unit was organized in 1887 by Colonel T. M. Scott, business manager of the College, for the purpose of banding together the most proficient military men in A. and M. College into a precision drill team. They were first called the Scott Volunteers. The name was changed to Ross Volunteers in 1891 to honor Governor Lawrence Sullivan Ross, who in that year became President of the College. It was originally the plan of the organization to change its name in honor of each succeeding president of the College, but in 1905 at President Harrington's request, the idea was dropped and the name Ross Volunteers made permanent.

There are several important cadet organizations that do not come under a specific classification. The following should be mentioned as having distinctive functions in cadet life: the Aggie Band, the largest college or university military band in the United States; the Rifle and Pistol Teams, which compete in national matches; and the Freshman Drill Team, a precision military drill team.

## STUDENT PUBLICATIONS

The Student Publications program at Texas A&M University provides students with excellent opportunities to learn and practice magazine and newspaper technique.

Management of the departments is vested in the Director of Student Publications and the Student Publications Board, composed of faculty members from each of the degree-granting colleges.

The following seven publications are published, each supervised by a student editor:

**The Battalion:** This student newspaper is published four days a week for campus readers and residents of the city of College Station. Staff members have excellent opportunities to learn newspaper management and responsibility in addition to news-writing and editing. Junior and senior editors receive salaries commensurate with their responsibilities.

**The Aggieland:** The yearbook of the student body has the largest staff requirement in Student Publications, and recruits from all classes are welcomed to document the school year's activities.

**The Engineer:** Published six times annually by students in the College of Engineering, this journal promotes scholarly investigations and technical writing.

**The Agriculturist:** Students in the College of Agriculture produce a quarterly magazine which concerns itself with articles related to the field of agriculture.

**The Southwestern Veterinarian:** Produced quarterly by students of the College of Veterinary Medicine, this publication is rated as one of the nation's leading college veterinary journals.

**The A&M Review:** A magazine of campus-wide interest is edited by students in the College of Liberal Arts and published four times a year.

**Student Directory:** Each year the Office of Student Publications publishes a University directory of students, faculty, and staff.

Participation in Student Publications is not limited to any course of study or student classification. All interested students should contact the department, which is located on the ground floor of the YMCA Building.

## THE TEXAS AGGIE BAND

The Texas Aggie Band is the official band of Texas A&M University. It is often referred to as the "pulse of the Spirit of Aggieland" and furnishes music for military ceremonies, yell practices, and athletic events.

The Texas Aggie Band is housed as a military unit of the Corps of Cadets, and band members may pursue either the Army or Air Force ROTC program. Band members may take any course of study offered at the University. As the University has no School of Music, the total rehearsal time is limited to approximately four and one-half hours per week.

Interested new students should indicate on the advanced room reservation card their desire to participate. No try-outs are necessary. Although a large number of University-owned and government-owned instruments are available for issue, it is advised that students having their own instruments bring them.

## INTRAMURAL ATHLETICS

Intramural athletics feature contests among military units and among civilian organizations. A separate program is maintained for military freshmen. The intramural program, which is one of the most outstanding in the country, includes badminton, basketball, bowling, fencing, flag football, golf, handball, horseshoes, rifle, softball, swimming and diving, table tennis, tennis, track, volleyball, and wrestling. Ample physical facilities are available to accommodate these comprehensive intramural activities.

## INTERCOLLEGIATE ATHLETICS

Texas A&M University is a member of the Southwest Athletic Conference, which embraces eight leading major colleges and universities — the University of Texas, Texas A&M University, Baylor University, Rice University, Texas Christian University, Southern Methodist University, the University of Arkansas, and Texas Technological College. The intercollegiate program includes football, baseball, basketball, track, cross country, swimming, tennis, and golf. Varsity teams in each sport are known as



the Texas Aggies, and the uniforms used by the players are in the school's colors, maroon and white.

## OFFICE OF PLACEMENT AND STUDENT AID

### Employment for Graduates

The University feels a definite responsibility for the proper professional placement of its graduates. Assistance in fulfilling this responsibility is shared jointly by the faculty and the Office of Placement and Student Aid. The function of this office is to maintain active contact with prospective employers of the graduating students and alumni in such manner that well qualified men may be directed to suitable job opportunities.

Supplementing assistance in securing professional employment, this office cooperates with other University departments in an educational program designed to acquaint undergraduates with opportunities in the fields of work in which they are interested, and to advise on problems which will be met in entering professional employment. Assistance is given students in preparing credentials for submission to employers as well as advice on the proper approach in seeking a job. Assistance is also given undergraduates in securing employment during the summer vacation.

Seniors and graduate students who wish to make use of these services are requested to file a record of their qualifications with the Placement and Student Aid Office early in the year in which their university work will be completed. There is no charge for this service other than for personal leaflets, which are prepared at cost on request.

### Employment for Students

Part-time employment of resident students is coordinated by the Office of Student Aid, a part of the services of the Office of Placement and Student Aid. Every effort is made to develop new employment opportunities. To become eligible for employment, a student must have been admitted to the University by the Director of Admissions and have an accepted application on file with the Office of Student Aid. Continued eligibility for employment is contingent on satisfactory performance of work and on the ability of the student to maintain good scholastic standing.

Ordinarily only those students whose financial resources are limited may be considered for employment. Assignments are made primarily on the basis of need and sincerity of purpose.

### Loan Funds

The University is participating in the National Defense Education Act Student Loan program and in the United Student Aid Fund, Inc. Available funds are limited, and applications should be made not later than May 15 for the next school year or December 1 for the next Spring semester. Inquiries should be addressed to the Placement and Student Aid Office.

The Office of Student Aid administers other substantial loan funds which are available to students who have completed at least one successful semester of attendance.

Smaller emergency loans are available through the Office of Student Aid to students already enrolled. Emergency type small loans, limited to \$20.00 for 30 days, are available to students on presentation of identification card and current fee slip. A small service charge is made for these loans.

Loan eligibility is based upon the student's satisfactory record, and the amount of each loan depends upon the student's actual needs.

## ACADEMIC REGULATIONS

Certain academic regulations have been set up by the faculty for the purpose of assisting the student to secure the maximum benefit from his studies. These regulations, contained in the copy of **University Regulations** given to each student when he enters the University, serve as a guide in such important matters as choice of course and subjects, methods of study, attendance, examinations, promotion, and graduation.

By means of reports at regular intervals, frequent conferences with the deans, the Registrar, Office of the Dean of Students, and members of the teaching staff, the authorities of the University keep in close touch with the student's progress; and such advice and counsel are offered from time to time as seem justified in each case. For failure to keep up with his studies, the student may at any time be dropped from the rolls of the University.

The University reserves the right to modify the curricula or withdraw any course when it appears wise to do so.

## DEGREES OFFERED

The following degrees are offered for the satisfactory completion of resident study in the appropriate curriculum:

Bachelor of Arts (B.A.)  
 Bachelor of Business Administration (B.B.A.)  
 Bachelor of Science (B.S.)  
 Bachelor of Architecture (B.Arch.)  
 Bachelor of Petroleum Engineering (B.P.E.)  
 Doctor of Veterinary Medicine (D.V.M.)  
 Master of Agriculture (M.Agr.)  
 Master of Architecture (M.Arch.)  
 Master of Arts (M.A.)  
 Master of Business Administration (M.B.A.)  
 Master of Computing Sciences (M.C.S.)  
 Master of Education (M.Ed.)  
 Master of Engineering (M.Eng.)  
 Master of Science (M.S.)  
 Doctor of Education (D.Ed.)  
 Doctor of Philosophy (Ph.D.)

## REQUIREMENTS FOR A BACCALAUREATE DEGREE

The diploma of the University, with the appropriate degree, will be granted to the student who has made formal application for the undergraduate degree and has satisfied the following requirements:

1. He must complete with at least a C average one of the regular courses of study leading to a degree.
2. The total number of grade points earned at this institution in courses applied to this degree must equal at least the number of hours which he carried in courses at this institution which are applied to this degree. Grades of F or WF shall be included, except such grades and grades of D made in the freshman year or summer session preceding that year which are subsequently repeated at this university with a grade of C or better during the student's first four semesters at this university. Grades of WP shall be excluded.
3. The total number of grade points earned at this institution in courses in his major department applicable to this degree must equal at least the number of hours which he carried at this institution in his major department which are applied to this degree. Grades of F and WF shall be included, but grades of WP shall be excluded.
4. Grades made in courses elected in excess of a student's degree requirements shall be counted, but if failed such courses need not be repeated.
5. A candidate for a baccalaureate degree is required to take the Graduate Record Examinations in the semester preceding the semester or term in which he expects to receive his degree.
6. Students of the Texas Maritime Academy are required to pass an examination administered by the United States Coast Guard for Third Mate or Third Assistant Engineer, United States Merchant Marine.
7. He must have settled all financial obligations to the University.



8. He must be formally recommended for graduation by the Academic Council after consideration of his complete record.

9. Unless registered in absentia or excused by his dean, he must be present in person at the graduation exercises.

These requirements must be completed and all grades on record in the Registrar's Office not later than 5 p.m. on Thursday preceding Commencement Day.

Requirements for an advanced degree are outlined by the Graduate College.

### APPLICATION FOR A DEGREE

During the semester or summer session preceding the conferring of the degree, a student must be officially registered in the University. Formal application for degrees must be submitted to the Registrar, on forms provided for that purpose, not later than 90 days prior to the end of the semester, or 30 days prior to the end of the summer term, in which the student expects to complete his requirements for graduation.

In order to be a candidate for a degree at the end of a semester or summer term, a student at the beginning of that semester or term must fulfill the following two conditions:

1. He must be registered for the courses necessary to complete the requirements of his curriculum.

2. For work of his final semester or summer term, he must not lack a grade point ratio in excess of 1.50 in his major field and for his over-all program of studies in order to meet the grade point requirement for graduation.

### RESIDENCE REQUIREMENT

A candidate for a baccalaureate degree must complete the requirements of the final year's work of his curriculum in residence at this institution except that six semester hours may be accepted in transfer. However, in every case the student must complete at least thirty-six semester hours of upper level work of the last two years of his curriculum at this institution.

In satisfying baccalaureate degree requirements, a junior college student transferring to this University must complete in residence at least the equivalent of the total semester hours required in the junior and senior years of his curriculum minus six hours. The work completed at Texas A&M University must include thirty-six semester hours of upper level work of the last two years of his curriculum.

Candidates for a baccalaureate degree in the College of Agriculture will be expected to complete approximately the last two years in residence at this institution. Acceptance of transfer credit for courses in agriculture will generally be limited to those courses taught in the freshman and sophomore years at this institution.

A student may qualify for the Bachelor of Science degree by completing the three-year premedical curriculum at Texas A&M University and at least one year at a Class A medical school, with a minimum total of 137 acceptable semester hours, subject to the usual grade point requirement.

A student may qualify for the Bachelor of Science degree by completing the three-year premedical curriculum at Texas A&M University and at least one year at a Class A dental school with a minimum total of 137 acceptable semester hours, subject to the usual grade point requirement.

A student may qualify for the Bachelor of Arts degree by completing the three-year prelaw curriculum at Texas A&M University and one year at an accredited law school with a minimum total of 137 acceptable semester hours, subject to the usual grade point requirement.

### GRADUATION WITH HONORS

All candidates for baccalaureate or Doctor of Veterinary Medicine degrees are eligible for graduation with "Honors." Graduation with Honors shall be based upon the average of all grades made by a student on the courses taken at Texas A&M University. Those students who complete less than seventy-five semester hours of credit at Texas A&M University must show a grade point ratio on all work done

elsewhere equal to that required at this university for the appropriate category for honors. They shall be designated as follows:

(1). With High Honors: To be graduated with "High Honors" a student must have a grade point ratio of 2.80 or above.

(2). With Honors: A student may be graduated with "Honors" if his grade point ratio is within the range of 2.50 to 2.79 inclusive.

## TWO DEGREES

A candidate for a second Bachelor's degree must have been in residence at least two academic years and must have completed all the essential work of the second curriculum not covered in the first; in all such cases the total amount required must be at least 30 semester hours additional to the greater number required for either degree.

## CHANGE OF CURRICULUM

Applications for change of curriculum shall be passed upon by the deans of the colleges and schools concerned. A student under 21 years of age must have the written consent of his parent or guardian.

## CREDIT BY EXAMINATION FOR ENTERING FRESHMEN

Advanced standing credit will be given for scores of 5, 4, and 3 which are made on the College Board Advanced Placement Examinations with a grade of "A" to be assigned for a score of 5, "B" for a score of 4, and "C" for a score of 3 with no grade to be granted for a score below 3. Appropriate credit will be given by the Registrar. Credit can be established in the following areas:

American History

Biology

Chemistry

English Composition

French

German

Mathematics

Spanish

The University offers its own series of advanced placement examinations. These examinations may be taken instead of the College Board Advanced Placement Examinations to obtain academic credit. There is no charge for taking these examinations. As soon as the department concerned has graded the examination, a credit card will be issued to the Registrar's Office giving the student appropriate grade and credit. Texas A&M University offers credit by examination in the following courses:

Biology, 101, 107, 115

Chemistry 101, 102

Engineering Graphics 105, 106

English 103, 104

History 105, 106

Mathematics 102, 103

Military Science 121, 122, 221, 222

Modern Language 101, 102, 103, 104, 105, 106, 109, 110

The Director of Admissions and Registrar will authorize these examinations and will furnish information to anyone interested in obtaining credit by examination.

## TRANSFER OF CREDITS

As a general policy credit will be given in transfer for work completed with a grade of C or better at another properly accredited institution. Work completed with the grade of D must be validated before it can be transferred. Validation may be by examination or by completion with a grade of C or better of more advanced work in the same subject area. Any student desiring to validate work done elsewhere should discuss with the Registrar the conditions necessary for validation of his particular work and secure from him authorization for such action. Credits given by transfer are provisional and may be cancelled at any time if the student's work in the University is unsatisfactory.



Work done in an institution not properly accredited must be validated by one of the two methods of validation already mentioned before it can be transferred.

Acceptance of transfer credit for courses in agriculture will generally be limited to those courses normally taught in the freshman and sophomore years at this institution.

### **CORRESPONDENCE COURSES**

Texas A&M University offers no correspondence courses. A student in residence at this institution will be permitted to receive undergraduate credit for correspondence courses taken elsewhere only when written permission has been granted in advance by the dean of his college or school.

Credit earned in a course completed by correspondence will be accepted only after a validating examination has been passed unless the final examination is taken under the supervision of the Registrar at this university. An exception will be made in the case of courses taken through the United States Armed Forces Institute.

Not more than twelve semester hours of credit taken in correspondence work may be applied toward the requirements for a degree. No more than 30 semester hours of approved extension class and correspondence study credit may be applied toward a Bachelor's degree.

### **REQUIREMENT IN GOVERNMENT AND HISTORY**

In order to meet the legal requirements for a baccalaureate degree, all students must have credit for six semester hours of American history or three semester hours of American history and three semester hours of Texas history, and credit for three semester hours of American National Government (Government 206) and three semester hours of State and Local Government (Government 207) or three semester hours of American National Government and three semester hours of military credit. Students who do not have military credit are required to take Government 207 and one additional hour of elective in place of the four hours of ROTC specified in the freshman and sophomore years of all curricula.

### **REQUIREMENT IN PHYSICAL EDUCATION**

All students under 21 years of age at the time of entrance are required to complete Physical Education 101, 102, 201, 202.

Transfer students will be given exemption from one semester of required physical education for each semester of course work completed at the other institution.

Students who have completed as much as one year of service in the Armed Forces of the United States on active duty will be exempt from the requirement in physical education.

### **CORPS OF CADETS**

Membership in the Corps of Cadets is voluntary. A student who joins the Cadet Corps and has his uniform issued must remain in the Corps until the end of the semester for which he is enrolled. Freshmen and sophomores desiring membership in the Corps of Cadets are required to enroll in either Army or Air Force ROTC if they are qualified for such enrollment. The qualification requirements for enrollment in Military Science or Air Science are that the applicant must be: (a) a citizen of the United States, (b) physically qualified, and (c) accepted for enrollment by the officer-in-charge of the respective program of instruction.

Enrollment in Army or Air Force ROTC is not a prerequisite for membership in the Corps of Cadets for those entering freshmen who are not qualified for such enrollment, or have had prior military service, or, in the case of Army ROTC, have successfully completed three years of junior ROTC. Cadets not enrolled in ROTC are designated drills and ceremonies cadets.

Enrollment in Army or Air Force ROTC is synonymous with enrollment in the Corps of Cadets and is part of the military training as offered at this University. The Corps is organized and housed in dormitories as military units which are constantly under military discipline and supervision.

## ADVANCED COURSE ROTC CONTRACTS

The University offers both the Four-Year and the Two-Year Army and Air Force ROTC Programs. The advanced course, which leads to an officer's commission, is the same for students in either the Four-Year or the Two-Year Programs. Students pursuing the Four-Year ROTC Program make application for an advanced course contract after completion of the first two years (basic course) of ROTC. The Two-Year Advanced Course Program is designated for junior college graduates and for students in four-year colleges and universities who have not participated in the ROTC program during the first two years. A basic six weeks' summer training period after the sophomore year takes the place of the basic course of ROTC instruction required of students in the Four-Year Program. Acceptance of an advanced course ROTC contract requires completion of the advanced course ROTC curriculum, completion of ROTC summer camp, and acceptance of a reserve commission if one is tendered.

## ACADEMIC CREDIT IN MILITARY TRAINING FOR EX-SERVICEMEN

Students who have completed one year of service in the Armed Forces of the United States on active duty are exempt from further military training and may be given academic credit of four semester hours for basic ROTC.

Students who have completed six months (under RFA 1955) but less than one year of active duty in the Armed Forces of the United States may be given academic credit for the first year of ROTC. Such students may be given academic credit for two semester hours of basic ROTC.

Students who have served for at least one year in the Armed Forces of the United States on active duty as commissioned officers may be given academic credit of sixteen semester hours for basic and advanced ROTC.

A student wishing to receive such credit should file a photostatic or certified copy of his DD214 with the Registrar's Office so that appropriate credit may be allowed.

## THE GRADING SYSTEM

Since one attends a college or university to extend his education, his grades are usually taken as an indication of the proficiency of his endeavors. The student's semester grade in a course is based upon recitation, written exercises and tests, laboratory work, and the final examination. The final examination has a weight of one-fourth of the final grade, and the proportionate weight assigned to each of the other factors is determined by the head of the department administering the course.

There are four passing grades signifying various degrees of achievement, and grade points are awarded on the basis of these grades.

Grade	Description	Range (Inclusive)	Grade Points per Semester Hour
A	Excellent	92-100	3
B	Good	84- 91	2
C	Fair	76- 83	1
D	Passing	70- 75	0

The lowest passing grade is 70. There is one failing grade, F, below 70, indicating work of unsatisfactory quality. Credit for a course failed may be obtained only by satisfactorily repeating the course in class, except that in a course including both theory and practice, the head of a department may excuse a student from repeating the practice if his grade in the practice is B or better, and if in the judgment of the head of the department the repetition is not necessary. The student must register for both theory and practice, however.

The temporary grade "Inc." (Incomplete) indicates that the student has satisfactorily completed the course with the exception of a major quiz, final examination, or other work. This grade is given only when the deficiency is due to authorized absence or other cause beyond the control of the student and when the work already done has been of a quality acceptable for the satisfactory completion of the course. The privilege of completing such work is limited to the end of the first month of his succeeding semester in the University; otherwise the student must repeat the



course in order to receive credit, unless for good reason his dean grants an extension of time.

Permission to remove a semester grade of "Inc." received because of absence from a quiz or examination may be granted by the head of the department only on receipt of official notice that the absence was authorized or evidence that the cause for the absence prevented making normal preparation to take the quiz or examination before the close of the semester.

When a student resigns or is dropped from the University after the first two weeks of a semester, the Registrar calls for his grades and enters on his permanent record the symbol WP after each course in which he is passing and WF after each course in which he is not making a passing grade. All WF's and F's will be taken into account in determining his grade point ratio thereafter unless for cause the Executive Committee directs otherwise.

The semester grade in a subject which a student is required to drop on account of failure to keep up with the work is F.

### REPETITION OF A COURSE TO IMPROVE GRADE

Any student who wishes to repeat a course to improve his grade in that course must do so before he completes a more advanced course in the same subject-matter field.

### GRADE POINT RATIO

A student's grade point ratio for any period is computed by dividing the total number of semester hours for which he received grades into the total number of grade points earned in that period. Grades of WF and F are included, but grades of WP are excluded.

Only the record made in course work for which the student was registered in this institution is used in determining his grade point ratio.

### GRADE REPORTS

**Preliminary Report:** A preliminary report of the student's progress is sent to the parent or guardian about eight weeks after the beginning of each semester.

**Semester Reports:** At the close of each semester, a report of the student's work during the semester is sent directly to the parent or guardian.

**Unsatisfactory Work:** During the session the deans receive reports from the members of the teaching staff on students doing unsatisfactory work. These reports form the basis for personal conferences with the students concerned and for special notices to parents and guardians.

**Reports to High Schools:** At the close of the first semester, a report is sent to each accredited high school showing the grades made by the freshmen entering the University from that school.

### DISTINGUISHED STUDENTS

A student who completes a semester schedule of at least 15 hours with no grade lower than C and with a grade point ratio of not less than 2.25 for the semester shall be designated as a "Distinguished Student." In official acknowledgment of the designation, he is issued a Distinguished Student card by the dean of his college.

As a recognition of his scholastic achievement, the University allows a Distinguished Student to present his card to the instructor during the next succeeding semester after he distinguishes and, without requirement or privilege of making up the work missed, absent himself from any theory class except for announced quizzes provided, however, that any student who without permission of the instructor leaves a class to which he has reported shall be given a grade of zero for the day's work. This privilege may be revoked for cause at any time by the dean of the student's college.

### HONORARY SCHOLASTIC SOCIETIES

Students ranking near the top of their class scholastically will be considered for admission to one or more of the national honorary societies described below. The honor societies are intended to reward the student of character and ability, and membership

in them is a well-recognized mark of distinction which becomes a part of one's permanent record.

**Alpha Delta Sigma.** This national professional fraternity in advertising is for students who have declared an interest in advertising as a career and who have demonstrated an above average aptitude in the field. Membership is by election. Its purpose is to encourage and develop leadership in advertising.

**Alpha Kappa Delta.** This is the only national sociology honor society. Membership is by election and all graduate and undergraduate students with at least a "B" average in sociology, an over-all grade point average of 2.00, and at least 10 hours of sociology are eligible as candidates for this society.

**Alpha Pi Mu.** This fraternity is a national industrial engineering society. Eligibility for membership is limited to juniors in the upper fifth of the industrial engineering class, and to seniors in the upper third, together with demonstrated qualities of leadership, ethicality, sociability, and breadth of interest.

**Alpha Zeta.** This is the oldest national agricultural honor fraternity in the country. Election to membership usually is limited to junior and senior students in agriculture who have achieved outstanding records of scholarship, character, and leadership in their chosen fields.

**Chi Epsilon.** Civil engineering students may be elected by the present membership to this national honorary scholastic fraternity. It is open to junior and senior students who have a scholastic rank in the upper one-third of their class with an appropriate grade point ratio as defined in the membership requirements of the society.

**Eta Kappa Nu.** Electrical engineering majors are eligible for membership in this national honor society. It is open to junior students in the top one-fourth of their class and to senior students in the top one-third of their class.

**Gamma Sigma Delta.** This international honor society elects members from seniors in Agriculture and eighth or ninth tri-semester students in Veterinary Medicine who are in the upper 15 percent of their class and have 2.0 minimum grade point ratio. Students with 16 hours in the Graduate College and at least a 2.5 ratio are eligible.

**Iota Lambda Sigma.** This fraternity is a national society open to all industrial education majors. Students are required to have an over-all grade point average of 1.50, and of 2.00 in industrial education courses for membership. Its objectives are to encourage and develop scholarship, leadership, and a professional pride among the industrial education students.

**Phi Delta Kappa.** The membership in this international fraternity for men in education is composed of leaders in the profession and students whose potential has been identified. Members include classroom teachers, administrators, and college and university professors. Sharing of common interests makes possible promotion of free public education through research, service, and leadership.

**Phi Eta Sigma.** A student who, during his first freshman semester in the University, carried an academic load of at least 13 semester hours and attained a grade point ratio of 2.50 or better is eligible for membership in the Texas A&M Chapter of this national freshman scholastic fraternity. One not meeting these requirements at the end of the first semester but who attains an average grade point ratio of 2.50 or better for the first two semesters is eligible.

**Phi Kappa Phi.** Open to all academic fields in the undergraduate colleges, this honor society elects its membership from those students who are within a year of graduation in a four-year course and are within the top one-tenth of their class scholastically. The student must have been registered one year in the University to be eligible. Graduate students with outstanding records who have satisfied the residence requirement are also eligible for membership.

**Phi Lambda Upsilon.** This is the oldest national chemical honor fraternity in the country. Election to membership is limited to junior, senior, and graduate students in chemistry and chemical engineering who have achieved outstanding records of scholarship, character, and leadership in their chosen fields.

**Phi Zeta.** Students in the College of Veterinary Medicine who rank in the upper ten per cent of the second year class or upper twenty-five per cent of the third year class and who have a grade point ratio of at least 2.25 in their entire veterinary curriculum through the preceding trimester are eligible for election to this honor society.



**Pi Kappa Delta.** This national forensic fraternity is open to students who have distinguished themselves in debate and forensics.

**Pi Tau Sigma.** From mechanical engineering students in the top quarter of their junior class and top third of their senior class, there may be elected to this national mechanical engineering fraternity those whose high character and whose specific grades meet the requirements of the local chapter.

**Sigma Delta Chi.** This is the national professional journalistic society for men in journalism. Membership is by election. Journalism majors are eligible for consideration after they have completed the first semester of their sophomore year. Candidates must have an above average scholastic rating and must have demonstrated a desire to practice journalism as a life profession.

**Sigma Gamma Tau.** Aerospace engineering students may be elected by the present membership to this national honorary scholastic fraternity. The minimum grade point ratio is 2.00 for eligibility for this society.

**Sigma Pi Sigma.** Students elected to membership in this national physics honor society must attain high standards of scholarship, make outstanding achievement in physics, and show promise of professional merit. A minimum grade point average of 2.00 and a grade of B or better in an advanced physics course is required for eligibility.

**Sigma Tau Delta.** This national English professional fraternity is open to junior, senior, and graduate English majors who have distinguished themselves in scholarship, leadership, and character. Those elected to membership must have a grade point average of 1.65 over-all and of 2.00 in English courses after three full semesters of college level work.

**Sigma Xi.** The object of this society is to encourage original investigation in science, pure and applied. It is open to graduate students and to staff members of the Texas A&M University System who have shown a marked excellence in one or more departments of pure or applied science and given evidence of an aptitude for scientific research.

**Tau Beta Pi.** Students in the College of Engineering who rank in the top one-eighth of the junior class or top one-tenth of the senior class are eligible for election to this society. This is the oldest national engineering society founded for the purpose of recognizing scholarship.

## SCHOLASTIC PROBATION

Whenever a student's cumulative record indicates that he is failing to make satisfactory progress, he is considered as scholastically deficient. The cause of the deficiency will be investigated by the dean of his college, and the student may be placed on scholastic probation of such terms as the dean shall designate, or he may be required to withdraw from the University if the deficiency warrants.

Scholastic probation is a conditional permission for a student to continue in school after he has become scholastically deficient or after he has incurred an excessive number of unauthorized absences. This permission is granted by the dean of the student's college when an analysis of the deficiency indicates that a continuation is in the best interests of the student and the University.

## CLASSIFICATION

Sophomore, junior, and senior classification will be granted on completion of 30, 60, and 95 semester hours respectively.

## EXCESS HOURS

A student may register for the regular semester program in his curriculum if he is in good standing. With the dean's approval, necessary adjustments for minor irregularities may be authorized up to 20 hours. Registration for 21 hours or more may be approved under the following conditions:

Hours	Grade Point Ratio Last Semester or Overall
21	1.50
22	2.00
23	2.25
24	2.50

The normal amount of work a student may carry in a six-week summer term is 6 semester hours (or 7 if part is practice). Hours in excess of a normal load may be authorized in certain cases by the student's dean in conformance with the limitations that apply during the academic year. For the entire summer session the maximum number permissible is 15 semester hours.

## PREPARATION FOR TEACHING

Teacher education is an important part of the university curriculum, so much that it is a university-wide enterprise. The Council on Teacher Education, an administrative body, comprised of representatives from all colleges and departments engaged in teacher education, gives general direction to the institutional program. All of the teacher preparation programs are fully certified and meet the standards set forth by the State of Texas and the Texas Education Agency.

Students who decide on a career in teacher education will find the field offers many challenging opportunities for advancement. The good teacher should possess a keen desire to work understandingly with youths, their parents, and his professional associates.

A student may prepare for teaching by selecting a program in one of four departments of the University. These are the Department of Agricultural Education in the College of Agriculture; the Department of Education and Psychology and the Department of Health and Physical Education, both in the College of Liberal Arts; and the Department of Industrial Education in the College of Engineering.

The student may choose teaching fields from among those listed below:

Agricultural Education	Health and Physical Education
Biology	History
Business	Industrial Arts Education
Chemistry	Industrial Vocational Education
Driver Education	Journalism
English	Mathematics
General Science	Physics
Geography	Social Studies
Government	Spanish

An approved graduate program is available to those who wish to do additional work in the Departments of Agricultural Education, Education and Psychology, Health and Physical Education, and Industrial Education. Professional programs are approved for certification of superintendents, principals, supervisors, counselors, visiting teachers, and master teachers within subject-matter areas.

The Placement Office of the University endeavors to assist graduates and students of the University in securing suitable teaching positions and to assist boards of education and other officials in securing teachers. The Placement Office makes every effort to place candidates who register for the service in good positions. Information obtained from professors and others is confidential. No charge is made for this service.

### Agricultural Education

Training provided in Agricultural Education prepares the prospective teacher to operate a program of vocational agriculture as an integral part of the high school educational system. Agricultural education majors also qualify for a second teaching field in biology. The curriculum in agricultural education provides a well-rounded education in areas involving teacher-student and teacher-community relationships, science, technical agriculture, and general education.

Courses involving teacher-student and teacher-community relationships offered in the agricultural education curriculum are educational psychology, secondary school curriculum, principles of agricultural education, course building for in-school youth, Future Farmer and Young Farmer activities, adult education, methods of developing supervised farming programs, student teaching in vocational agriculture, and agricultural journalism. These courses are designed to develop basic educational philosophies, methods of selecting problems to be taught, and methods of teaching in-school youth, young farmers, and adult farmers.



A minimum of 54 semester hours in technical agriculture is required for agricultural education graduates. This provides an opportunity for the graduate to have a knowledge of the technical agriculture that is essential for successfully teaching vocational agriculture. Master of Education and Master of Science degrees are also available with majors in agricultural education.

General education receives emphasis in the agricultural education curriculum. This includes courses in English, history, government, mathematics and economics. Thirty semester hours of science are included in the agricultural education curriculum. This training prepares the prospective high school teacher of vocational agriculture to operate an efficient educational program in agriculture. Since this educational program includes both high school students and adult farmers, the prospective teacher must be technically and professionally competent.

### **Education and Psychology**

The Department of Education and Psychology offers programs of teacher preparation in many academic areas taught in the high school and the elementary school. Areas of specialization may be obtained in biology, business, chemistry, English, general science, geography, government, health and physical education, history, journalism, mathematics, physics, and Spanish.

Students may choose to major in the Department of Education and Psychology or in the University department representing their subject-matter specialty. In either case the student planning to teach in high school must complete a 24-hour sequence in each of two teaching fields, or he must select a 48-hour approved program in either general science or social studies. In addition 18 hours of courses in education and psychology will be required for certification. Majors in the department itself will take 12 additional hours in professional development and will follow the four-year program outlined in the section of this catalogue devoted to the College of Liberal Arts.

Students planning to teach in the elementary school must select an 18-hour approved sequence in a single subject-matter field and 18 hours in approved courses related to the elementary school curriculum. An additional 30-hour sequence in education and psychology is required. Majors in the Department will take 11 additional hours of approved courses and will follow the four-year program outlined in the section of this catalogue devoted to the College of Liberal Arts.

The Department offers graduate programs leading to the degree of Master of Education, Master of Science, and Doctor of Philosophy. These programs prepare students for professional certification as master teachers or as superintendents, principals, supervisors, counselors, or visiting teachers. Certification at the professional level requires three years of teaching experience in addition to a planned graduate program.

### **Health and Physical Education**

The Department of Health and Physical Education offers a major for those students, both men and women, who are interested in a career as a: (1) teacher of health and physical education in either secondary or elementary school; (2) coach of athletics; or (3) as an athletic trainer. Students completing the teacher education program in Health and Physical Education will be eligible for a secondary teaching certificate and an all-grade-level certificate in health and physical education.

The Department also offers graduate study leading to the Master of Education degree and to the Professional Certificate in Health and Physical Education.

### **Industrial Education**

The Department of Industrial Education offers two options in teacher preparation leading to the Bachelor of Science degree in industrial education. Qualified students may pursue any of the courses of study described below with reasonable assurance of being able to secure a position in the field for which they have prepared. Master of Education, Master of Science, and Doctor of Education degrees are also available with majors in industrial education.

### **Industrial Arts Education**

Graduates of this curriculum may become industrial arts teachers in the junior and senior high schools of the State. (Industrial arts in these schools includes general shop, electrical work, woodwork, technical drawing, plastics, ceramics, leather, and other craft

courses.) The industrialization of the Southwest has created many outstanding opportunities for the prospective industrial arts teacher.

### **Vocational Industrial Education**

The vocational industrial teacher education option in the industrial education curriculum is intended for teachers, supervisors, and directors for the vocational industrial schools and classes of Texas. Since the men completing this course are to qualify as teachers under the State Plan for Vocational Education, a candidate for a degree must satisfy the requirements for one of the classes of vocational teachers as specified in the State Plan. The Head of the Department of Industrial Education will assist the student in the preparation of his degree plan.

## **COUNSELING AND GUIDANCE SERVICE**

### **Purposes**

The Counseling and Testing Center provides testing, counseling, and guidance services to students and related consultative services to the faculty and staff.

### **Counseling**

Limited specialized counseling of students is the responsibility of the Counseling and Testing Center. At the Center is a staff of competent and well trained men who are available to work with students. A student may request help of the Counseling and Testing Center, or he may be referred by a proper representative of the University, a parent, or other interested persons.

The student will find at the Center professional, sympathetic persons with whom he can discuss in confidence a personal problem, a vocational problem, or an educational problem.

The counselor may call upon the resources of the University (departmental advisors, student loan agencies, the University Hospital, etc.) to help the student in making an effective adjustment to his problem. The counselor is a person who understands the complex organization of the University, the requirements, the different curricula. In short, it is a part of the counselor's job to know the various resources available and to refer the student to them.

### **Guidance**

The Center provides consulting services and in some instances short periods of training to the University family on problems related to study, University orientation, and vocational guidance.

### **Vocational Reading Room**

The Counseling and Testing Center provides a Vocational Reading Room to students who are investigating vocations.

### **Remedial Services**

To the limit of time and personnel the Center will work with individuals on problems of reading and study.

### **Testing Services**

Texas A&M University requires three College Entrance Examination Board tests as a part of its admission procedure for all applicants seeking admission to their first semester of college or university work. Results of these tests are to be used for admission, counseling, and placement purposes. The following tests are required:

- Scholastic Aptitude Test (SAT)
- English Composition Achievement Test
- Mathematics Test, Level I (Standard)
- Or
- Mathematics Test, Level II (Intensive)

The College Entrance Examination Board offers these examinations at conveniently located testing centers throughout the United States and in major cities of many foreign countries. Information regarding testing dates, location of testing

centers, fees required, and test registration instructions may be obtained by writing to the College Entrance Examination Board, Box 592, Princeton, New Jersey. This same information may also be obtained from most high school counselors. It is the applicant's responsibility to make arrangements for taking the examinations. Arrangements are to be made directly with the College Board, not through Texas A&M University.

The University will accept scores on either the Mathematics Test, Level I (Standard) or the Mathematics Test, Level II (Intensive). However, most students will be expected to take the Mathematics Test, Level I (Standard). Students interested in taking the Mathematics Test, Level II (Intensive), should do so only after careful study of the College Entrance Examination Board publication, "Achievement Tests," and a conference with the high school counselor or Mathematics teacher.

Several two day conferences will be conducted during the summer months on the campus of Texas A&M University for all applicants who have qualified for admission to the fall semester as beginning freshmen. At these counseling sessions, the CEEB test scores will be interpreted to each student, and additional tests in chemistry, reading, and other areas will be administered. Although the student bears the expense of the CEEB tests, there is no charge other than for meals and overnight accommodations for the testing and counseling conferences on the campus during the summer months. Following the student's acceptance into the University by the Director of Admissions, the Counseling and Testing Center will write to him concerning these summer counseling conferences.

All inquiries concerning admission should be addressed to the Director of Admissions, Texas A&M University, College Station, Texas, 77843.

### The Texas A&M Adjunct

The Texas A&M Adjunct is a summer school with a camp atmosphere for students entering college for the first time. The University has developed a beautiful campsite of 411 acres on the South Llano River in the heart of the Texas Hill Country, about one mile from Junction, Texas. Two six week terms are offered each summer.

A well rounded program for each student includes classwork, study, and recreation. The student may take seven hours of regular college work, chosen from biology, education, English, history, mathematics, and physical education. Teachers and counselors are available to help the student with problems that may arise.

At the first of each term every student is given a supplementary group of tests. This group consists of achievement and interest tests which, with the CEEB scores, aid the counselor in helping the student decide upon his course of study for the summer term and his future course of study to follow in the University.

An organized inter-cabin competitive intramural program is offered. Also, swimming, canoeing, and fishing activities are conducted in the cool, clear water, of the South Llano River. An outdoor amphitheater is available for variety shows and group meetings.

The Texas A&M Adjunct is administered by the Counseling and Testing Center through the Dean of Academic Administration. In almost every case staff members come from the regular faculty of Texas A&M University. The Center works closely with the departments who offer courses in the instructional programs.



# *The College of Agriculture*

## ADMINISTRATIVE OFFICERS

R. E. Patterson, B.S., M.S., Ph.D. .... Dean  
R. C. Potts, B.S., M.S., Ph.D. .... Assistant Dean

## GENERAL STATEMENT

The various curricula in the College of Agriculture have as their main objective the preparation of young men for farming, ranching, and other businesses associated with agriculture; for harvesting, processing, and marketing of food and fiber products; for the pursuit of scientific investigation in the broad field of agriculture, including soils, water and plant and animal products, both native and cultivated; for careers in teaching or extension work in agriculture; for work with various governmental and private agricultural agencies; or for the teaching of conservation and management of our natural and cultivated resources. Systematic training is given in the sciences of chemistry, physics, mathematics, and biology, all of which are fundamental to the study of scientific agriculture. The curricula offered give the student a wide range of choice in the selection of a major, and elective courses provide excellent opportunity for enlarging his field of learning in keeping with his individual interest and needs.

## CURRICULA

Agricultural Economics	Food Technology
Agricultural Administration Option	*Forestry Science
Farm Management Option	Poultry Science
Agricultural Education	Range Science
Agricultural Engineering	Recreation and Parks
Agricultural Journalism	Sociology
Animal Science	Human Relations Option
Commercial Option	Rural Leadership Option
Science Option	Soil and Crop Sciences
Production Option	Agronomy
Dairy Science	Floriculture
Manufacturing Option	Horticulture
Production Option	Plant and Soil Science
Entomology	Wildlife Science
	Fisheries Option

\*The present curriculum includes the first two years of forestry and a Ph.D. program.

## Curricula in AGRICULTURAL ECONOMICS

Trained personnel are needed in agricultural economics in the fields of marketing and price analysis, farm and ranch management, resource economics, agricultural policy and finance, and consumer economics.

### Agricultural Administration Option

The program in agricultural administration prepares students for employment with governmental and private agencies; in such positions as research workers, marketing specialists, agricultural agents of banks and business firms; as extension workers; and as salesmen and teachers. Electives in business administration prepare students for work in businesses related to agriculture. Electives in technical agriculture prepare a student who wishes to become a specialist in the marketing of a particular farm product.

## FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Ag.Ec. 105 Intr. to Agricultural Economics	3	An.Sc. 107 Gen. Animal Science	
Agro. 105 Funds. of Crop Production	3	Or	
Biol. 115 Survey of Biology	4	P.S. 201 Poultry Production	3
Engl. 103 Composition & Rhetoric	3	Chem. 106 Gen. Chemistry	4
Math. 102 Algebra	3	Engl. 104 Composition & Rhetoric	3
M.S. or A.S.	1	Math. 110 Survey Course in Math.	3
P.E. 101	R	M.S. or A.S.	1
	17	Soc. 205 Prin. of Sociology	3
		P.E. 102	R
			17

## SOPHOMORE YEAR

Acct. 227 Prin. of Accounting	4	Acct. 228 Prin. of Accounting	4
Ag.Ec. 314 Mktg. Agricultural Products	3	Econ. 204 Prin. of Economics	3
Econ. 203 Prin. of Economics	3	Engl. 210 Argumentation	3
Engl. 203 Intr. to Literature	3	Govt. 206 American National Govt.	3
M.S. or A.S.	1	M.S. or A.S.	1
Stat. 201 Elem. Statistical Inference	3	Elective	3
P.E. 201	R	P.E. 202	R
	17		17

## JUNIOR YEAR

Ag.Ec. 317 Quant. Analysis in Agr. Econ.	3	Ag.Ec. 325 Prin. of Farm & Ranch Mgmt.	3
Ag.Ec. 413 Agricultural Cooperatives		Ag.Ec. 422 Land Economics	3
Or		Econ. 311 Money & Banking	3
Ag.Ec. 452 International Trade & Agr.	3	Hist. 325 Trends in American Hist.	3
B.Ana. 303 Statistical Method	4	Elective	5
Econ. 323 Economic Analysis	3		17
Elective	4		
	17		

## SENIOR YEAR

Ag.Ec. 447 Agricultural Prices	3	Ag.Ec. 429 Agricultural Policy	3
Ag.Ec. 481 Seminar	1	Ag.Ec. 430 Agricultural Finance	
Engl. 301 Writing for Professional Men	3	Or	
Hist. 326 History of Texas	3	Ag.Ec. 432 Farm & Ranch Appraisal & Org.	3
Elective	7	Soc. 411 Social Psychology	3
	17	Spch. 403 Public Speaking	3
		Elective	5
			17

NOTE: A.S. 401 or M.S. 321 may be substituted for Spch. 403.

## Farm Management Option

The program in farm management prepares students for the operation of farms and ranches and for professional and commercial work dealing with agriculture. Electives in technical agriculture permit students to emphasize the study of particular agricultural enterprises.

## FRESHMAN YEAR

Ag.Ec. 105 Intr. to Agr. Economics	3	Agro. 105 Funds. of Crop Production	3
Biol. 107 Vertebrate Zoology	3	Biol. 101 Gen. Botany of Seed Plants	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	Math. 110 Survey in Math.	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	Elective	1
	17	P.E. 102	R
			18

## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
An.Sc. 107 Gen. Animal Science	3	Ag.Ec. 314 Mktg. Agricultural Products	3
Chem. 231 Elem. Organic Chemistry	3	Ag.En. 201 Farm Power & Machinery	3
D.S. 202 Dairying	3	Econ. 204 Prin. of Economics	3
Or		Engl. 210 Argumentation	3
P.S. 201 Poultry Production	3	Hort. 201 Gen. Horticulture	3
Econ. 203 Prin. of Economics	3	M.S. or A.S.	1
Engl. 203 Intr. to Literature	3	Elective	1
Ento. 201 Gen. Entomology	3	P.E. 202	R
M.S. or A.S.	1		17
P.E. 201	R		
	19		

## JUNIOR YEAR

Ag.Ec. 321 Farm & Ranch Records	3	Ag.Ec. 325 Prin. of Farm & Ranch Mgmt.	3
Agro. 301 Soil Science	3	An.Sc. 303 Animal Nutrition	3
Econ. 323 Economic Analysis	3	B.Ana. 303 Statistical Method	4
Gen. 301 Genetics	4	Phys. 213 Phys. for Agr. Students	3
Soc. 205 Prin. of Sociology	3	Elective	5
Elective	1		18
	18		

## SENIOR YEAR

Ag.Ec. 432 Farm & Ranch Appraisal	3	Ag.Ec. 429 Agricultural Policy	3
Ag.Ec. 447 Agricultural Prices	3	Govt. 206 American National Govt.	3
Ag.Ec. 481 Seminar	1	Hist. 326 History of Texas	3
Hist. 325 Trends in American Hist.	3	Spch. 403 Public Speaking	3
Jour. 415 Agr. Journalism	3	Elective	6
Elective	5		18
	18		

### Curriculum in AGRICULTURAL EDUCATION

This curriculum, which includes well balanced selections in various areas of technical agriculture, is designed to give the teacher of vocational agriculture the preparation and training in both technical agriculture and professional education, including student teaching, required for teacher certification under the Texas Education Agency State Plan for Vocational Education. Students also qualify for the biology teaching certificate.

In addition to being certified to teach vocational agriculture, graduates of this curriculum find employment with the agricultural extension service and the soil conservation service, in agricultural public relations work with banks and other agencies, with chambers of commerce and news gathering and reporting agencies, and with industries related to agriculture.

## FRESHMAN YEAR

An.Sc. 107 Gen. Animal Science		Agro. 105 Funds. of Crop Production	
Or		Or	
P.S. 201 Poultry Production	3	Hort. 201 Gen. Horticulture	3
Biol. 101 Gen. Botany of Seed Plants	3	Biol. 107 Vertebrate Zoology	3
Engl. 103 Composition & Rhetoric	3	Chem. 101 Gen. Chemistry	4
Hist. 105 Hist. of United States	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	16		17



## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Ag.En. 221 Farm Shop	2	Ag.En. 222 Farm Shop	2
Chem. 102 Gen. Chemistry	4	Chem. 232 Elem. Organic Chemistry	5
Econ. 203 Prin. of Economics	3	D.S. 202 Dairying	3
Ento. 201 Gen. Entomology	3	Govt. 207 State and Local Govt.	3
Or		M.S. or A.S.	1
Ento. 313 Biology of Insects	3	Elective (Physical Science <sup>2</sup> )	3
Govt. 206 American National Govt.	3	P.E. 202	R
Jour. 201 <sup>1</sup> News Writing	3		17
M.S. or A.S.	1		
P.E. 201	R		
	—		
	19		

## JUNIOR YEAR

Ag.Ec. 314 Mktg. Agricultural Products	3	Ag.Ec. 325 Prin. of Farm & Ranch Mgmt.	3
Ag.Ed. 301 Intr. to Agr. Education	2	Agro. 318 Soil Conservation	4
Ag.En. 201 Farm Power & Machinery	3	Gen. 301 Genetics	4
Or		Psy. 301 Educational Psychology	3
Ag.En. 325 Farm Electricity	3	Elective (Plant Science <sup>4</sup> )	3
Agro. 301 Soil Science	4		—
An.Sc. 303 Animal Nutrition	3		17
Elective (Plant Science <sup>3</sup> )	3		
	—		
	18		

## SENIOR YEAR

Ag.Ed. 425 Course Building	2	Ag.Ed. 427 Meth. of Devel. Farm Programs	2
Ag.En. 335 Water Control & Utilization	3	Ag.Ed. 436 <sup>6</sup> Student Tchg. in Ag.Ed.	6
Educ. 444 Sec. School Curriculum	3	An.Sc. 416 Livestock Mgmt.	3
Jour. 415 <sup>1</sup> Agricultural Journalism	3	Or	
Elective (Animal Science <sup>5</sup> )	3	D.S. 420 Dairy Mgmt.	2
Elective	2	P.S. 401 Mgmt. & Selection	2
	—	Elective	4
	16		—
			16

- NOTES: 1. A course in English may be elected in place of this course.
2. The physical science elective is to be selected from: Geol. 205; Math. 103, 104, 110; Phys. 213.
3. This plant science elective is to be selected from: Agro. 304; Biol. 102, 206, 327; P.P.P. 313; R.S. 205, 303.
4. This plant science elective is to be selected from: Agro. 308; P.P.P. 301; R.S. 314.
5. This animal science elective is to be selected from: An.Sc. 306, 433; Ento. 301; W.S. 401, 403.
6. The laboratory hours in Ag.Ed. 436 will include one-half semester of off-campus student teaching.

### Curriculum in AGRICULTURAL ENGINEERING

The curriculum in agricultural engineering is under the joint supervision of the College of Agriculture and the College of Engineering. Agricultural engineering deals with the application of the fundamental branches of engineering to the peculiar conditions and requirements of agriculture as an industry and as a field of applied science. The term "agricultural engineer" denotes an engineer who has been trained in both engineering and agriculture, with experience in combining the two, and who is qualified to develop, design, organize, and direct engineering work in agriculture and closely allied industries.

In general, agricultural engineering may be broken down into five major phases of activity: power and machinery; agricultural structures design; farm electrification; agricultural process engineering; and soil and water control and conservation, which includes drainage, flood control, irrigation, and soil erosion control.

Graduates of this curriculum are prepared for service in teaching, extension, and research; with government soil and water control projects; with manufacturers of farm equipment in advertising, sales, and design work; with engineering and contracting firms; with agricultural processing industries; and with building and equipment manufacturers.

Students who expect to enter the agricultural engineering curriculum and are not thoroughly grounded in the fundamentals of algebra and trigonometry are urged to attend a six-week term of summer school prior to the fall semester of the freshman year and take courses in algebra and trigonometry equivalent to Mathematics 102 and 103 at Texas A&M University. Those students who enter the fall semester's work not prepared to take Mathematics 121 should replace Mathematics 121 and History 105 in their fall schedule with Mathematics 102 and 103. Before the end of the fall semester, these students should contact the Head of the Department of Agricultural Engineering for specific instructions and a degree plan.

## FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Ag.En. 101 Agricultural Engr. Probs.	2	Chem. 102 Gen. Chemistry	4
Chem. 101 Gen. Chemistry	4	E.G. 105 Engineering Graphics	2
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Math. 209 Calculus	3
Math. 104 Analytic Geometry	3	M.S. or A.S.	1
M.S. or A.S.	1	Phys. 218 Mechanics & Heat	4
P.E. 101	R	P.E. 102	R
	16		17

## SOPHOMORE YEAR

Ag.En. 208 Agricultural Machinery	3	Chem. 232 Elem. Organic Chemistry	5 or 4
Agro. 105 Funds. of Crop Production		Or	
Or		Phys. 220 Modern Physics	
Biol. 101 Gen. Botany of Seed Plants	3	Math. 307 Calculus	3
C.E. 206 Plane Surveying	1	M.E. 212 Engineering Mechanics	3
Hist. 106 Hist. of United States	3	M.S. or A.S.	1
Math. 210 Calculus	3	Technical Elective	2 or 3
M.S. or A.S.	1	Elective (Humanities or Social Science)	3
Phys. 219 Sound, Light, Electricity	4	P.E. 202	R
P.E. 201	R		17
	18		

## JUNIOR YEAR

Ag.En. 302 Environmental Engineering	3	Ag.En. 324 Agr. Engine & Tractor Design	3
C.E. 305 Mechanics of Materials	3	Agro. 301 Soil Science	4
Govt. 206 American National Govt.	3	C.E. 311 Hydraulics	3
Math. 308 Differential Equations		C.E. 336 Hydraulics Lab.	1
Or		Technical Elective	2
Stat. 406 Statistical Methods	3	Elective	4
Elective (Humanities or Social Science)	3		—
Elective	2		17
	17		

## SENIOR YEAR

Ag.En. 401 Environ. Design of Agr. Structures	3	Ag.En. 410 Irrigation & Drainage Engr.	3
Ag.En. 428 Soil & Water Conserv. Engr.	3	Ag.En. 413 Agr. Structures Design	3
Ag.En. 418 Agr. Process Engineering	3	Ag.En. 430 Electr. & Electron. in Agr.	4
Ag.En. 481 Seminar	1	Ag.En. 482 Seminar	1
Agro. 445 Soil Physics	3	Technical Elective	3
Technical Elective	2	Elective (Humanities or Social Science)	3
Elective (Humanities or Social Science)	3		17
	17		

- NOTES: 1. All electives are to be selected in consultation with the departmental advisor.
2. A minimum of 3 semester hours of technical elective will be in an appropriate engineering science.
3. Any 200- or 400-level course or courses which require as a prerequisite individually or in combination any of the following courses may be used as a technical elective: Agro. 301; Biol. 101; Chem. 232; C.E. 305, 311; Math. 307.
4. Any of the following courses as well as courses for which these are prerequisite may be used as technical electives: An.Sc. 303; Biol. 206; C.E. 301, 306; Hort. 201; M.E. 313, 323; Met. 305 or 465; Phys. 430.

## Curriculum in AGRICULTURAL JOURNALISM

The curriculum in agricultural journalism is designed to prepare students for professional careers as agricultural writers and editors, including work on bulletins and magazines as well as on rural and metropolitan newspapers, and in radio-TV broadcasting.

The first two years are planned to give students the fundamental studies. The program gives students an adequate background for general journalistic work and affords them opportunities to prepare themselves as specialists in certain phases of agricultural writing.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Agro. 105 Funds. of Crop Production	3	An.Sc. 107 Gen. Animal Science	3
Biol. 107 Vertebrate Zoology	3	Biol. 101 Gen. Bot. of Seed Plants	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	Jour. 102 Communications Media & Prin.	2
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	R.S. 102 Intr. to Range & Forestry	1
	—	P.E. 102	R
	17		—
			17

### SOPHOMORE YEAR

Chem. 231 Elem. Organic Chem.	3	Ag.En. 201 Farm Power & Machinery	3
D.S. 202 Dairying	3	Biol. 206 Intr. Microbiology	3
Engl. 212 Shakespeare		Econ. 203 Prin. of Economics	3
Or		Hort. 201 Gen. Horticulture	3
Engl. 231 or 232 Surv. of English Lit.	3	Jour. 202 Beginning News Reporting	3
Ento. 201 Gen. Entomology	3	M.S. or A.S.	1
Jour. 201 News Writing	3	P.E. 202	R
M.S. or A.S.	1		—
P.S. 201 Poultry Production	3		16
P.E. 201	R		
	—		
	19		

### JUNIOR YEAR

Agro. 301 Soil Science	4	Ag.Ec. 314 Mktg. Agricultural Products	3
Gen. 301 Genetics	4	An.Sc. 303 Animal Nutrition	3
Govt. 206 American National Govt.	3	Jour. 311 Radio & TV News Writing	3
Jour. 307 News Editing	3	Jour. 315 Photography	2
Phys. 213 Phys. for Agr. Students	3	Elective*	6
	—		
	17		17

### SENIOR YEAR

Hist. 325 Trends in American Hist.	3	Ag.Ec. 429 Agricultural Policy	3
Jour. 304 Feature Story Writing	3	Hist. 326 Hist. of Texas	3
Jour. 308 Newspaper Advertising	3	Jour. 410 Publ. Prod. & Graphic Arts	3
Spch. 403 Public Speaking	3	Soc. 407 Human Relations in Agr.	3
Elective*	5	Elective*	5
	—		
	17		17

\*NOTE: Electives shall be selected and substitutions made with the advice of the Head of the Department. Econ. 323 and courses in sociology, plant pathology, plant physiology, wildlife science, and soil conservation are recommended electives.



## Curricula in ANIMAL SCIENCE

The curricula in animal science are designed to prepare students for careers in private and public businesses dealing primarily with the production of livestock and processing of livestock products. Research in nutrition, breeding, reproductive physiology, meats, dairy products, wool and mohair, production and management coupled with extensive laboratory facilities and livestock operations on and near campus result in courses being taught on a fully scientific basis designed for practical application.

The curriculum leading to a degree in food technology is designed to train students in the technical and scientific fundamentals of food processing and manufacturing. The elective hours allow specialization in dairy manufacturing, meat and meat products, poultry, poultry products, fruit, vegetable and cereal products, or food industry engineering.

### Science Option

The science option is planned especially for students preparing for graduate study.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
An.Sc. 107 <sup>1</sup> Gen. Animal Science	3	Biol. 101 Gen. Botany of Seed Plants	3
Biol. 107 Vertebrate Zoology	3	Biol. 108 Invertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	—		—
	17		17

### SOPHOMORE YEAR

Biol. 206 Intr. Microbiology	3	Chem. 228 Organic Chemistry	4
Chem. 227 Organic Chemistry	4	Econ. 203 Prin. of Economics	3
Math. 104 Analytic Geometry	3	Engl. 203 Intr. to Literature	3
M.S. or A.S.	1	Or	
Phys. 201 College Physics	4	Engl. 210 Argumentation	3
Elective <sup>2</sup>	3	Math. 209 Calculus	3
P.E. 201	R	M.S. or A.S.	1
	—	Phys. 202 College Physics	4
	18	P.E. 202	R
	—		—
	17		18

### JUNIOR YEAR

Biol. 217 Comp. Anat. of Vertebrates		Agro. 301 Soil Science	4
Or		An.Sc. 303 Animal Nutrition	3
Biol. 343 Histology	3	Biol. 344 Embryology	3
Chem. 316 Quantitative Analysis	2	Engl. 301 Writing for Professional Men	3
Chem. 319 Quant. Anal. Lab.	2	Elective	4
Gen. 301 Genetics	4		—
Hist. 325 Trends in American Hist.	3		17
Elective	3		—
	—		—
	17		17

### SENIOR YEAR

B.N. 410 <sup>3</sup> Intr. Biochemistry	4	An.Sc. 481 Seminar	1
Biol. 433 Gen. Physiology	4	Govt. 206 American National Govt.	3
Stat. 406 Statistical Methods	3	Hist. 326 Hist. of Texas	3
Elective	6	Spch. 403 Public Speaking	3
	—	Elective	7
	17		—
	17		17

- NOTES: 1. D.S. 202 or P.S. 201 may be substituted.
2. Ento. 201 or 208 or Chem. 226 is recommended.
3. The student planning further study in animal science, biochemistry and nutrition, dairy science, genetics, or poultry science should select suitable elective courses with the advice of the Head of the Department.

## Production Option

The production option prepares students to be ranch managers, livestock buyers, livestock association representatives, county agricultural agents, and for related livestock enterprises. Courses in addition to basic animal science include agronomy, range management, genetics, and veterinary medicine. Elective courses are selected by the student with the aid of the departmental advisors.

## FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
An.Sc. 107 Gen. Animal Science	3	Agro. 105 Funds. of Crop Production	3
Biol. 107 Vertebrate Zoology	3	Biol. 101 Gen. Botany of Seed Plants	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	Hist. 105 Hist. of United States	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	17		17

## SOPHOMORE YEAR

Acct. 227 Prin. of Accounting	4	Econ. 203 Prin. of Economics	3
Chem. 232 Elem. Organic Chemistry	5	Engl. 203 Intr. to Literature	
Ento. 208 Veterinary Entomology	3	Or	
M.S. or A.S.	1	Engl. 210 Argumentation	3
Stat. 201 Elem. Statistical Inference	3	Hist. 106 Hist. of United States	3
P.E. 201	R	M.S. or A.S.	1
	16	Phys. 213 Phys. for Agr. Students	3
		V.A. 202 Veterinary Anatomy	3
		P.E. 202	R
			16

## JUNIOR YEAR

An.Sc. 303 Animal Nutrition	3	Agro. 301 Soil Science	4
An.Sc. 307 Meats	3	An.Sc. 306 Animal Breeding	3
An.Sc. 433 Reprod. in Farm Animals	3	An.Sc. 309 Feeds and Feeding	3
Gen. 301 Genetics	4	Animal Science (elective)	3 or 4
V.Mi. 301 Microorganisms in Animal Dis.	3	V.P.P. 323 Physiol. of Farm Animals	3
Elective	2	Elective	2 or 1
	18		18

## SENIOR YEAR

Agro. 308 Forage Crops		Agricultural Economics (elective)	3
Or		An.Sc. 437 Mktg. & Grad. Livestock & Meats	3
R.S. 314 Prin. of Range Mgmt.	3	An.Sc. 481 Seminar	1
Animal Science (elective)	3	Spch. 403 Public Speaking	3
Engl. 301 Writing for Professional Men	3	V.Par. 487 Parasites of Farm Animals	3
Govt. 206 American National Govt.	3	Elective	4
Elective	5		
	17		17

## Commercial Option

The commercial option prepares the students for positions in the meat packing, feed, and livestock pharmaceutical industries; in livestock marketing; and in related agricultural interests. Courses in accounting, personnel management, business law, and psychology, in addition to the basic animal science courses, orient this option particularly toward the commercial livestock field. A number of graduates have obtained desirable positions as livestock representatives for banks, insurance companies, and other loan companies. Elective courses are selected by the student with the aid of the departmental advisors.

(Same as Production Option except that students substitute Mgmt. 211, 363 and Psy. 303 for Agro. 308, V. Par. 487, and V.P.P. 323.)

## Curricula in DAIRY SCIENCE

Trained personnel are much in demand to aid, service, manage, and direct the production, manufacture, and distribution of milk and dairy foods.

### Dairy Manufacturing Option

This major is designed to prepare students for careers in dairy plant operation and management; plant field work and dairy product quality control; teaching and research work in milk and dairy food processing; merchandising and sales. Fundamental technical and business courses offer a well rounded program of training in these areas.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 107 Vertebrate Zoology	3	Biol. 101 Gen. Botany of Seed Plants	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	D.S. 202 Dairying	3
Hist. 105 Hist. of United States	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	17		17

### SOPHOMORE YEAR

Chem. 232 Elem. Organic Chemistry	5	Ag.En. 213 Food Plant Engr.	3
Engl. 203 Intr. to Literature	3	Biol. 206 Intr. Microbiology	3
Or		Econ. 203 Prin. of Economics	3
Engl. 210 Argumentation	3	Govt. 206 American National Govt.	3
Ento. 201 Gen. Entomology	3	M.S. or A.S.	1
M.S. or A.S.	1	Elective	4
Phys. 213 Physics for Agr. Students	3	P.E. 202	R
Elective	2		—
P.E. 201	R		17
	17		

### JUNIOR YEAR

Acct. 409 Survey of Accounting Prin.	3	Acct. 430 Cost Accounting Survey	3
Ag.Ec. 314 Mktg. Agr. Products	3	D.S. 307 Sensory Eval. of Dairy Foods	1
D.S. 301 Market Milk	4	D.S. 311 Tech. Control of Dairy & Rel. Foods	4
D.S. 320 Bact. of Agr. Products	3	D.S. 316 Butter & Cheese Manufacture	3
Elective	4	Spch. 403 Public Speaking	2
	17	Elective	2
			17

### SENIOR YEAR

B.N. 401 Human Nutrition	3	An.Sc. 481 Seminar	1
D.S. 410 Food Plant Mgmt.	2	D.S. 407 Frozen & Freeze-Dried Dairy Foods	3
Engl. 301 Writing for Professional Men	3	D.S. 415 Concentrated Dairy & Rel. Foods	3
Or		Mgmt. 363 Prin. of Management	3
Jour. 415 Agricultural Journalism	3	Elective	7
Mgmt. 211 Business Law	3		—
Elective	6		17
	17		

### Dairy Production Option

This major is designed for students interested in careers as dairy farm operators or managers; as dairy herd owners and breeders of dairy cattle; as teachers and research workers in dairy nutrition, breeding, or management; as extension dairy specialists and organization leaders and as workers in allied fields.



## FRESHMAN YEAR

First Semester		Credit	Second Semester		Credit
Agro. 105	Funds. of Crop Production	3	An.Sc. 107	Gen. Animal Science	3
Biol. 107	Vertebrate Zoology	3	Biol. 101	Gen. Botany of Seed Plants	3
Chem. 101	Gen. Chemistry	4	Chem. 102	Gen. Chemistry	4
Engl. 103	Composition & Rhetoric	3	Engl. 104	Composition & Rhetoric	3
Math. 102	Algebra	3	Hist. 105	Hist. of United States	3
M.S. or A.S.		1	M.S. or A.S.		1
P.E. 101		R	P.E. 102		R
		—			—
		17			17

## SOPHOMORE YEAR

D.S. 202	Dairying	3	Agricultural Economics (Elective)	3	
Econ. 203	Prin. of Economics	3	Ag.En. 201	Farm Power & Machinery	3
Ento. 201	Gen. Entomology	3	Chem. 232	Elem. Organic Chemistry	5
Hist. 106	Hist. of United States	3	Engl. 203	Intr. to Literature	
M.S. or A.S.		1	Or		
Phys. 213	Physics for Agr. Students	3	Engl. 210	Argumentation	3
P.E. 201		R	M.S. or A.S.		1
		—	V.A. 202	Veterinary Anatomy	3
		16	P.E. 202		R
					—
					18

## JUNIOR YEAR

D.S. 301	Market Milk	4	Agro. 301	Soil Science	4
D.S. 303	Dairy Cattle Judging	1	Agro. 308	Forage Crops	3
D.S. 320	Bact. of Agr. Products	3	An.Sc. 303	Animal Nutrition	3
Gen. 301	Genetics	4	An.Sc. 306	Animal Breeding	3
V.P.P. 323	Physiol. of Farm Animals	3	An.Sc. 433	Reprod. in Farm Animals	3
Elective		1			—
		16			16

## SENIOR YEAR

Ag.En. 335	Water Control & Utilization	3	An.Sc. 481	Seminar	1
D.S. 416	Milk Secretion & Milking	2	D.S. 324	Commercial Dairy Products	3
D.S. 417	Dairy Herd Improvement	3	D.S. 418	Feeding & Mgmt. of Dairy Cattle	4
Engl. 301	Writing for Professional Men	3	Spch. 403	Public Speaking	3
Or			Elective		7
Jour. 415	Agricultural Journalism	3			—
Govt. 206	American National Govt.	3			18
Elective		4			
		—			
		18			

Curriculum in  
ENTOMOLOGY

The program in entomology is intended to prepare students for careers in either research, extension, teaching, business, or industry. The curriculum includes basic studies in insect taxonomy, morphology, physiology, toxicology, and economic entomology. It also includes fundamental subject matter in the various fields of agriculture as well as in the biological sciences.

## FRESHMAN YEAR

Agro. 105	Funds. of Crop Production	3	Biol. 101	Gen. Botany of Seed Plants	3
An.Sc. 107	Gen. Animal Science	3	Biol. 108	Invertebrate Zoology	3
Biol. 107	Vertebrate Zoology	3	Chem. 102	Gen. Chemistry	4
Chem. 101	Gen. Chemistry	4	Engl. 104	Composition & Rhetoric	3
Engl. 103	Composition & Rhetoric	3	Math. 102	Algebra	3
M.S. or A.S.		1	M.S. or A.S.		1
P.E. 101		R	P.E. 102		R
		—			—
		17			17

## SOPHOMORE YEAR

First Semester		Credit	Second Semester		Credit
Chem. 232	Elem. Organic Chemistry	5	Ag.En. 201	Farm Power & Machinery	3
Ento. 201	Gen. Entomology	3	Econ. 203	Prin. of Economics	3
Hist. 105	Hist. of United States	3	Engl. 203	Intr. to Literature	
Hort. 201	Gen. Horticulture	3	Or		
Mgmt. 211	Business Law	3	Engl. 210	Argumentation	3
M.S. or A.S.		1	Hist. 106	Hist. of United States	3
P.E. 201		R	M.S. or A.S.		1
		18	Elective		3
			P.E. 202		R
					16

## JUNIOR YEAR

Ento. 301	Systematic Entomology	3	Biol. 206	Intr. Microbiology	3
Ento. 305	Insect Morphology	3	Ento. 302	Systematic Entomology	3
Govt. 206	American National Govt.	3	Ento. 306	Insect Physiology	3
Elective		3	Gen. 301	Genetics	4
		17	Elective		4
					17

## SENIOR YEAR

Ento. 401	Prin. of Insect Control	3	Agro. 301	Soil Science	4
Ento. 423	Medical Entomology	3	Engl. 301	Writing for Professional Men	3
P.P.P. 301	Plant Pathology	3	Ento. 402	Gen. Economic Entomology	3
Spch. 403	Public Speaking	3	Ento. 424	Insect Ecology	3
Elective		5	Elective		4
		17			17

- NOTES: 1. Electives shall be selected and substitutions made with the advice of the Head of the Department.
2. At least 16 but not more than 24 credit hours of advanced courses in the student's major department shall be permitted toward requirements for graduation.

Curriculum in  
FOOD TECHNOLOGY

The curriculum in food technology is designed to train students in the technical and scientific problems of foods and food processing and manufacturing. Students enrolled in this curriculum will select electives for specialization in meats, dairy, horticulture, poultry products, or agricultural engineering with the counsel of the head of the department under which the subject is offered.

## FRESHMAN YEAR

Biol. 101	Gen. Botany of Seed Plants	3	Biol. 107	Vertebrate Zoology	3
Chem. 101	Gen. Chemistry	4	Chem. 102	Gen. Chemistry	4
E.G. 105	Engineering Graphics	2	Engl. 104	Composition & Rhetoric	3
Engl. 103	Composition & Rhetoric	3	Math. 116	Plane Trig. & Anal. Geom.	4
Math. 102	Algebra	3	M.E. 101	Engineering Problems	1
M.S. or A.S.		1	M.S. or A.S.		1
P.E. 101		R	Elective		1
		16	P.E. 102		R
					17

## SOPHOMORE YEAR

Chem. 316	Quantitative Analysis	2	Agricultural Economics (elective)	3
Chem. 319	Quantitative Analysis Lab.	2	Chem. 317	Quantitative Analysis
Econ. 203	Prin. of Economics	3	Chem. 320	Instrum. Anal. Lab.
Govt. 206	American National Govt.	3	Engl. 203	Intr. to Literature
M.S. or A.S.		1	Or	
Phys. 201	College Physics	4	Engl. 210	Argumentation
Elective		2	M.S. or A.S.	
P.E. 201		R	Phys. 202	College Physics
		—	Elective	
		17	P.E. 202	
				R
				—

## JUNIOR YEAR

First Semester		Credit	Second Semester		Credit
Acct. 409	Survey of Accounting Prin.	3	Ag.En. 213	Food Plant Engr.	3
Biol. 206	Intr. Microbiology	3	Chem. 228	Organic Chemistry	4
Chem. 227	Organic Chemistry	4	D.S. 326	Food Bacteriology	4
Elective		7	Elective		7
		<hr/> 17			<hr/> 18

## SENIOR YEAR

D.S. 410	Food Plant Mgmt.	2	B.N. 401	Human Nutrition	3
Hist. 325	Trends in American Hist.	3	Chem. 342	Physical Chemistry	4
Psy. 207	Gen. Psychology	3	Engl. 301	Writing for Professional Men	3
Spch. 403	Public Speaking	3	Hist. 326	Hist. of Texas	3
Stat. 406	Statistical Methods	3	Mgmt. 211	Business Law	3
Elective		3	Elective		1
		<hr/> 17			<hr/> 17

NOTE: See below for Poultry Science and Page 52 for Soil and Crop Sciences.

### Curriculum in POULTRY SCIENCE

The growth of the poultry industry and the need for a rapid expansion of scientific and technical knowledge in the various fields of science basic to successful poultry production have supplied the motivation for the development of courses in this phase of agriculture. In no field of agriculture is an understanding of the science and practice of feeding, breeding, physiology, pathology, heating, ventilation, processing, and marketing more necessary or more rewarded than in the modern intensive methods of producing poultry meat and eggs. Undergraduate students are trained to operate commercial poultry farms, hatcheries, feed mills, and poultry processing plants. They also find employment with such allied industries as feed manufacturers, equipment distributors, and manufacturers of vaccines and biologics, with poultry publications, and with the Extension Service. Many graduates in poultry science choose to take graduate work in this and allied fields.

A curriculum in food technology, with emphasis on the technology of poultry and egg products, is available through the Department of Poultry Science. For details of this curriculum is page 48.

## FRESHMAN YEAR

Agro. 105	Funds. of Crop Production	3	Biol. 101	Gen. Botany of Seed Plants	3
An.Sc. 107	Gen. Animal Science	3	Chem. 101	Gen. Chemistry	4
Biol. 107	Vertebrate Zoology	3	Engl. 104	Composition & Rhetoric	3
Engl. 103	Composition & Rhetoric	3	Hist. 105	Hist. of United States	3
Math. 102	Algebra	3	M.S. or A.S.		1
M.S. or A.S.		1	P.S. 201	Poultry Production	3
P.E. 101		R	P.E. 102		R
		<hr/> 16			<hr/> 17

## SOPHOMORE YEAR

Acct. 227	Prin. of Accounting	4	Biol. 206 <sup>1</sup>	Intr. Microbiology	3
Chem. 102	Gen. Chemistry	4	Chem. 232	Elem. Organic Chemistry	5
Engl. 203	Intr. to Literature	3	D.S. 202	Dairying	3
Ento. 201	Gen. Entomology	3	M.S. or A.S.		1
Hist. 106	Hist. of United States	3	Phys. 213	Phys. for Agr. Students	3
M.S. or A.S.		1	Elective		1
P.E. 201		R	P.E. 202		R
		<hr/> 18			<hr/> 16

## JUNIOR YEAR

Ag.En. 221	Farm Shop	2	Ag.Ec. 314	Mktg. Agricultural Products	3
Econ. 203	Prin. of Economics	3	P.S. 303	Turkey Production	2
Gen. 301	Genetics	4	P.S. 308	Hatchery Management	3
Govt. 206	American National Govt.	3	P.S. 309	Broiler Production	3
V.P.P. 323	Physiol. of Farm Animals	3	V.Mi. 334	Poultry Diseases	3
Elective		3	Elective		3
		<hr/> 18			<hr/> 17



## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
P.S. 407 Tech. & Mktg. of Poultry	3	Engl. 301 Writing for Professional Men	3
P.S. 411 Prin. of Nutrition	4	Or	1
P.S. 414 Poultry Breeding	3	Jour. 415 Agricultural Journalism	3
Elective	7	P.S. 481 Poultry Seminar	1
	—	Spch. 403 Speaking for Professional Men	3
	17	V.Par. 487 Par. of Farm Animals & Poultry	3
		Elective	7
			<hr/> 17

NOTES: 1. V.Mi. 301 may be substituted for Biol. 206.

2. See suggested elective courses in choosing suitable elective credits.

Curricula in  
SOCIOLOGY

Sociology, as one of the behavioral sciences, takes human behavior as its basic unit of study. The curricula are designed for breadth in education, particularly as they apply to the understanding of human relationships.

## Human Relations Option

The program provides professional training in human relations with special emphasis on social organization, social change, demography, social problems, social psychology, urban and industrial development, criminology, and social work.

Graduates are qualified for employment in a wide range of opportunities involving diplomacy, administration, and social work.

## FRESHMAN YEAR

Biol. 115 Survey of Biology	4	Chem. 106 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Geog. 201 World Regional Geography	3	Hist. 106 Hist. of United States	3
Hist. 105 Hist. of United States	3	Math. 110 Survey Course in Math.	3
Math. 102 Algebra	3	M.S. or A.S.	1
M.S. or A.S.	1	Soc. 205 Prin. of Sociology	3
P.E. 101	R	P.E. 102	R
	<hr/> 17		<hr/> 17

## SOPHOMORE YEAR

Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 203 Intr. to Literature	3	Engl. 210 Argumentation	3
Govt. 206 American National Govt.	3	M.S. or A.S.	1
M.S. or A.S.	1	Phys. 211 Brief Survey of Phys.	4
Psy. 207 General Psychology	3	Soc. 206 Social Institutions & Processes	3
Elective	4	Elective	3
P.E. 201	R	P.E. 202	R
	<hr/> 17		<hr/> 17

## JUNIOR YEAR

Gen. 301 Genetics	4	Biol. 325 Physical Anthropology	3
Phil. 301 Intr. to Philosophy	3	Educ. 439 Educational Statistics	3
Psy. 305 Personality Adjustments	3	Soc. 320 Social Anthropology	3
Or		Soc. 412 Population Analysis	3
Psy. 323 Psy. of Adolescence	3	Elective	5
Soc. 306 Prin. of Social Work			<hr/> 17
Or			
Soc. 314 Social Problems	3		
Soc. 310 Cultural Anthropology	3		
Elective	1		
	<hr/> 17		

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
C.E. 408 Municipal Administration	3	Acct. 409 Survey of Accounting Prin.	
Govt. 325 Intr. to Public Administration	3	Or	
Soc. 411 Social Psychology	3	Mgmt. 422 Personnel Probs. of Industry	3
Soc. 430 Sociological Theory	3	Spch. 403 Public Speaking	3
Soc. 481 Seminar	1	Soc. 404 Community Development	3
Elective	4	Elective	8
	<hr/> 17		<hr/> 17

## Rural Leadership Option

This program combines professional training in human relations with technical agriculture to provide training needed for special types of employment situations involving agriculture, agricultural organizations, and rural people.

## FRESHMAN YEAR

Ag.Ec. 105 Intr. to Agr. Economics	3	Ag.En. 201 Farm Power & Machinery	3
Agro. 105 Funds. of Crop Production	3	Chem. 101 Gen. Chemistry	4
Biol. 115 Survey of Biology	4	Engl. 104 Composition & Rhetoric	3
Engl. 103 Composition & Rhetoric	3	Ento. 201 Gen. Entomology	3
Math. 102 Algebra	3	Hort. 201 Gen. Horticulture	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	<hr/> 17		<hr/> 17

## SOPHOMORE YEAR

An.Sc. 107 Gen. Animal Science		Ag.En. 325 Farm Electricity	3
Or		Engl. 210 Argumentation	3
P.S. 201 Poultry Production		M.S. or A.S.	1
Or		Psy. 207 Gen. Psychology	3
D.S. 202 Dairying	4	Soc. 206 Social Institutions & Processes	3
Chem. 102 Gen. Chemistry	3	Elective	4
Econ. 203 Prin. of Economics	3	P.E. 202	R
Engl. 203 Intr. to Literature	3		<hr/> 17
M.S. or A.S.	1		
Soc. 205 Prin. of Sociology	3		
P.E. 201	R		
	<hr/> 17		

## JUNIOR YEAR

Agro. 301 Soil Science	4	Agricultural Economics (elective)	3
Govt. 206 American National Govt.	4	Gen. 301 Genetics	4
Jour. 415 Agricultural Journalism	3	Plant Science (elective)	3
Soc. 314 Social Problems	3	Soc. 320 Social Anthropology	3
Elective	4	Elective	4
	<hr/> 17		<hr/> 17

## SENIOR YEAR

Ag.Ec. 422 Land Economics		Ag.Ed. 441 Agr. Extension Org. & Methods	3
Or		Hist. 326 Hist. of Texas	3
Ag.Ec. 429 Agricultural Policy	3	Soc. 404 Community Development	3
Hist. 325 Trends in American Hist.	3	Spch. 403 Public Speaking	3
Soc. 411 Social Psychology	3	Elective	5
Soc. 430 Sociological Theory	3		<hr/> 17
Soc. 481 Seminar	1		
Elective	4		
	<hr/> 17		

### Curricula in SOIL AND CROP SCIENCES

Training in the Department of Soil and Crop Sciences is broad and basic enough in scope to include all the aspects of agricultural crop production, processing, distribution and marketing, as well as the study of soil and its relationship to plant growth.

The student has the opportunity to select the area in which he has greatest interest by choosing one of the several curricula available in the Department.

The general curriculum followed in the first two years is designed to give the student the necessary foundation in the basic sciences of botany, chemistry, entomology, genetics, and mathematics upon which to build his selected specialized courses in the last two years.

There are four curricula available that allow the student a wide choice in specialized training. Three of the curricula are designed to give broad and basic training and include work in agronomic crops, floricultural crops, fruit and vegetable crops, and in the study of soils and plant-soil-water-nutrition relationships.

The fourth curriculum is a four year plant and soil science curriculum designed to prepare students for the more intensified scientific opportunities that exist in this field, including basic preparation for graduate work.

A degree program in food technology can be pursued in this department with emphasis on fruits, vegetables, and cereal grains. See page 48.

### Curricula in AGRONOMY, FLORICULTURE, AND HORTICULTURE

#### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 Gen. Botany of Seed Plants	3	Agro. 105 Funds. of Crop Production	3
Chem. 101 Gen. Chemistry	4	Biol. 102 Taxonomy of Flowering Plants	3
Engl. 103 Composition & Rhetoric	3	Or	
Math. 102 Algebra	3	Biol. 107 Vertebrate Zoology	3
M.S. or A.S.	1	Chem. 102 Gen. Chemistry	4
S.C.S. 101 Intr. to Soil & Crop Sciences	1	Engl. 104 Composition & Rhetoric	3
P.E. 101	R	Math. 103 Plane Trigonometry	3
	—	M.S. or A.S.	1
	15	P.E. 102	R
			17

#### SOPHOMORE YEAR

Ag.En. 325 Farm Electricity		Biol. 206 Intr. Microbiology	3
Or		Engl. 203 Intr. to Literature	
Phys. 213 Phys. for Agr. Students	3	Or	
Chem. 232 Elem. Organic Chemistry	5	Engl. 210 Argumentation	3
Ento. 201 Gen. Entomology	3	Hist. 106 Hist. of United States	3
Flor. 201 Prin. of Floriculture	3	Hort. 201 Gen. Horticulture	3
Hist. 105 Hist. of United States	3	Hum. 311 Use of Library Resources	1
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 201	R	Elective	2
	—	P.E. 202	R
	18		16

### Curriculum in AGRONOMY

The program in agronomy prepares students for work in the broad field of soil management and crop production. Agronomy training gives the student a thorough understanding of the basic sciences and, in addition, teaches him how to apply this knowledge in the improvement of crops and soils. The first phase of training includes such subjects as mathematics, chemistry, botany, entomology, bacteriology, genetics, and plant physiology. Specialized courses in plant and soil science, which emphasize efficient crop production practices and the conservation and improvement of soils, are provided in the last two years of the curriculum.



The agronomy graduate is well trained in those subjects dealing with crops and soils and is qualified for the numerous activities related to this field of training. Professional opportunities include those in farming, farm management, and land appraisal; in fertilizer manufacture and sales, seed companies, grain marketing and milling, and agricultural equipment and supply businesses; in extension and education as county agents, extension specialists, college instructors, agricultural public relation specialists, and agricultural editors and directors; and in technical fields with the Agricultural Experiment Stations, United States Department of Agriculture, and Soil Conservation Service.

## FRESHMAN AND SOPHOMORE YEARS

(See page 52)

## JUNIOR YEAR

First Semester	Credit	Second Semester	Credit
Agro. 301 Soil Science	4	Ag. Ec. 314 Mktg. Agricultural Products	
Econ. 203 Prin. of Economics	3	Or	
Govt. 206 American National Govt.	3	Ag. Ec. 325 Prin. of Farm & Ranch Mgmt.	3
P.P.P. 301 Plant Pathology	3	Ag. En. 335 Water Control & Utilization	3
P.P.P. 313 Intr. to Plant Physiology	3	An. Sc. 303 Animal Nutrition	3
Elective	2	Gen. 301 Genetics	4
	<hr/>	Elective	5
	18		<hr/>
			18

## SENIOR YEAR

Agro. 306 Grain & Fiber Crops	4	Spch. 403 Public Speaking	3
Engl. 301 Writing for Professional Men		Elective (Social Science)	3
Or		Elective	11
Jour. 415 Agricultural Journalism	3		<hr/>
Elective	10		17
	<hr/>		
	17		

- NOTES: 1. Electives shall be selected with the advice of the student's faculty advisor, from whom a list of suggested electives may be obtained.
2. At least 16 but not more than 24 credit hours of advanced courses in Agronomy shall be permitted toward requirements for graduation.

Curriculum in  
FLORICULTURE

Floriculture and landscape horticulture are branches of agriculture concerned with the scientific production, distribution, marketing, and landscape use of ornamental plants and plant products.

The program in floricultural science is designed to prepare students for careers in the highly specialized and scientific operations involved in the production and marketing of nursery and greenhouse crops; the varied horticultural activities required in the development and maintenance of parks, recreation, and other landscaped areas both public and private; for positions in associated industries requiring executives, managers, and experts in the growing, packing, shipping and storage operations associated with greenhouse and nursery crops; as well as floral designers and technically trained salespeople. Many opportunities for employment also exist in teaching, research, and extension.

## FRESHMAN AND SOPHOMORE YEARS

(See page 52)

## JUNIOR YEAR

Agro. 301 Soil Science	4	Ag. En. 335 Water Control & Utilization	3
Econ. 203 Prin. of Economics	3	Flor. 307 Landscape Plant Materials	3
Flor. 206 Woody Ornamental Plants	3	Gen. 301 Genetics	4
P.P.P. 301 Plant Pathology	3	Govt. 206 American National Govt.	3
P.P.P. 313 Intr. to Plant Physiology	3	Elective	5
Elective	2		<hr/>
	<hr/>		18
	18		

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Engl. 301 Writing for Professional Men		Flor. 424 Scientific Plant Propagation	3
Or		Flor. 425 Landscape Maint. & Constr.	4
Jour. 415 Agricultural Journalism	3	Spch. 403 Public Speaking	3
Flor. 319 Exotic Plants	3	Elective (Social Science)	3
Flor. 429 Nursery & Greenhouse Crops	4	Elective	4
Elective	7		17
	17		

NOTE: Electives shall be selected with the advice of the student's faculty advisor.

Curriculum in  
HORTICULTURE

Horticulture is a science and an important component of the agricultural industry. It includes pomology (tree fruits, small fruits, and nuts), olericulture (vegetables grown in fields, greenhouses, and forcing structures), and processing (freezing, canning, and dehydration of horticultural crops).

Those planning careers in horticultural crops production, processing, packaging, industries, businesses, and state or federal agencies will wish to select this curriculum. Horticulturists often serve as field representatives and management personnel for canning and freezing companies, seed firms, and for manufacturers of fertilizers, spray materials, and farm equipment. Many are employed as inspectors of fresh and processed horticultural crops. Others are writers for farm and garden publications, television, and radio. The need for horticulturists in Agricultural Extension work is becoming more acute each year.

## FRESHMAN AND SOPHOMORE YEARS

(See page 52)

## JUNIOR YEAR

Econ. 203 Prin. of Economics	3	Ag.Ec. 314 Mktg. Agricultural Products	
Hort. 311 Processing Horticultural Crops	3	Or	
Hort. 322 Vegetable Crops Mgmt.	3	Ag.Ec. 325 Prin. of Farm & Ranch Mgmt.	3
P.P.P. 301 Plant Pathology	3	Agro. 301 Soil Science	4
P.P.P. 313 Intr. to Plant Physiology	3	Gen. 301 Genetics	4
Elective	3	Govt. 206 American National Govt.	3
	18	Hort. 319 Orchard Mgmt.	3
			17

## SENIOR YEAR

Ag.En. 335 Water Control & Utilization	3	Ento. 405 Horticultural Pests	3
Engl. 301 Writing for Professional Men		Spch. 403 Public Speaking	3
Or		Elective (Social Sciences)	3
Jour. 415 Agricultural Journalism	3	Elective	3
Hort. 481 Seminar	1		17
Elective	11		
	18		

NOTE: Electives shall be selected with the advice of the student's faculty advisor.

Curriculum in  
PLANT AND SOIL SCIENCE

The science curriculum is designed for the outstanding student who is interested in preparing himself for the scientific agricultural industries of the future. This curriculum requires intensive training in biology, chemistry, mathematics, and physics. While emphasis is on basic sciences, a foundation in social sciences and humanities and agricultural sciences is also included.

The curriculum is designed to prepare the student for graduate study, research, teaching, commercial agriculture, and provide him with better scientific qualifications for other positions available to graduates with a major in one of the other plant or soils curricula in the College of Agriculture.

## FRESHMAN YEAR

(Same as for Soil and Crops Sciences, page 52, except that plants majors may substitute Flor. 201 or Hort. 201 for Agro. 105.)

## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Biol. 206 Intr. Microbiology	3	Engl. 203 Intr. to Literature	
Chem. 227 Organic Chemistry		Or	
Hum. 311 Use of Library Resources	1	Engl. 210 Argumentation	3
Math. 121 Analytic Geom. & Calculus	4	Ento. 201 Gen. Entomology	3
M.S. or A.S.	1	Math. 210 Calculus	3
Phys. 201 College Physics		M.S. or A.S.	1
Or		Phys. 202 College Physics	
Phys. 218* Mechanics & Heat	4	Or	
P.E. 201	R	Phys. 219* Sound, Light, Electricity	4
	—	Approved Elective	3
	17	P.E. 202	R
			—
			17

\*All soils majors will elect Physics 218 and 219.

## JUNIOR YEAR

Chem. 316 Quantitative Analysis	2	Agro. 301 Soil Science	4
Chem. 319 Quant. Analysis Lab.	2	Govt. 206 American National Govt.	3
Econ. 203 Prin. of Economics	3	Hist. 106 Hist. of United States	3
Gen. 301 Genetics	4	P.P.P. 314 Prin. of Plant Physiology	4
Hist. 105 Hist. of United States	3	Approved Elective	3
P.P.P. 313 Intr. to Plant Physiology	3		—
	—		17
	17		

## SENIOR YEAR

Engl. 301 Writing for Professional Men	3	Spch. 403 Public Speaking	3
P.P.P. 301 Plant Pathology	3	Stat. 406 Statistical Methods	3
Approved Elective	12	Approved Elective	11
	—		—
	18		17

NOTE: Students must select all electives with the advice of the faculty advisor of the subject matter curriculum in which they are primarily interested. A list of suggested electives may be obtained from the faculty advisor.

## THE SCHOOL OF NATURAL BIO-SCIENCES

## PROFESSIONAL FIELDS OF STUDY

Forestry Science  
Range Science

Recreation and Parks  
Wildlife Science

## GENERAL STATEMENT

The several curricula in this school offer opportunities for students to obtain training in specific areas. At the same time emphasis will be placed on multiple land use along with the conservation and development of renewable natural resources.

Increasing activity in the field of Natural Bio-Sciences and the need for correlation of the management of our natural resources have created excellent opportunities for men who wish to work in these fields.

Two-Year Curriculum in  
FORESTRY SCIENCE

The two-year curriculum in forestry science provides the student with fundamental courses necessary for him to enter a Southern accredited school of forestry with junior standing. In addition to the arts and sciences, the curriculum includes the basic courses of plane surveying, agronomy, ecology, and forestry. The curriculum provides the fundamentals for study in the propagation, protection, and management of commer-



cial timbers, the processing and manufacture of wood products, and the conservation of all products derived from forests. All accredited Southern forestry schools have approved the curriculum as adequate to permit the student to obtain his Bachelor of Science degree in Forestry upon the completion of two additional years of study. The Texas Legislature has provided funds which are available to defray certain out-of-state expenses for Texas students who attend accredited Southern forestry schools for the junior and senior years.

During the junior and senior years, the forestry student has the opportunity to specialize in forest production, forest utilization, wood technology, pulp and paper technology, wood products merchandising, or extension and public relations forestry.

A degree from an accredited school of forestry prepares the graduate for work in the fields of forest administration, management, research, and education.

A student may obtain a Ph.D. degree in forestry at Texas A&M University.

### FRESHMAN YEAR

First Semester		Credit	Second Semester		Credit
Biol. 101	Gen. Botany of Seed Plants	3	Biol. 102	Taxonomy of Flowering Plants	3
Chem. 101	Gen. Chemistry	4	Biol. 108	Invertebrate Zoology	3
E.G. 105	Engr. Graphics	2	Chem. 102	Gen. Chemistry	4
Engl. 103	Composition & Rhetoric	3	Engl. 104	Composition & Rhetoric	3
Math. 102	Algebra	3	Math. 103	Plane Trigonometry	3
M.S. or A.S.		1	M.S. or A.S.		1
R.S. 102	Intr. to Range & Forestry	1	P.E. 102		R
P.E. 101		R			17
		17			

### SOPHOMORE YEAR

C.E. 201	Plane Surveying	4	Agro. 301	Soil Science	4
Econ. 203	Prin. of Economics	3	For. 201	Dendrology	4
Engl. 210	Argumentation	3	Geog. 203	Physical Geography	4
M.S. or A.S.		1	Govt. 206	American National Govt.	3
Phys. 213	Phys. for Agr. Students	3	M.S. or A.S.		1
Elective		3	R.S. 205	Plant Ecology	3
P.E. 201		R	P.E. 202		R
		17			19

NOTE: Students who complete this two-year curriculum may continue their work for a degree in forestry in any accredited Southern forestry school. Funds have been appropriated by the Texas Legislature to help defray certain out-of-state expenses for Texas students attending such schools for their junior and senior years.

### Curriculum in RANGE SCIENCE

This curriculum is designed to give students a thorough understanding of the great variety of problems met in the multiple use and conservation of noncultivated grazing lands. The first phase of training includes work in the physical, biological, and social sciences. Specialized courses in range science, range ecology, agrostology, forestry and conservation of natural resources are included in the last two years.

Graduates are prepared to enter the ranch business as owners or managers, for work as county agricultural agents, for work with Experiment Stations, and as college teachers in this field. A Bachelor's degree in range science gives the student the background for study toward advanced degrees. Men meeting Civil Service requirements are eligible for appointment with several United States Government agencies.

### FRESHMAN YEAR

Biol. 101	Gen. Botany of Seed Plants	3	Biol. 107	Vertebrate Zoology	3
Chem. 101	Gen. Chemistry	4	Chem. 102	Gen. Chemistry	4
Engl. 103	Composition & Rhetoric	3	Engl. 104	Composition & Rhetoric	3
Math. 102	Algebra	3	Math. 103	Plane Trigonometry	3
M.S. or A.S.		1	M.S. or A.S.		1
R.S. 102	Intr. to Range & Forestry	1	Elective*		R
P.E. 101		R	P.E. 102		3
		15			17

## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Biol. 102 Taxonomy of Flowering Plants	3	Chem. 228 Organic Chemistry	4
Chem. 227 Organic Chemistry	4	Govt. 206 American National Govt.	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	M.S. or A.S.	1
W.S. 201 Conservation & Mgmt.	3	R.S. 205 Plant Ecology	3
Elective*	3	Elective*	3
P.E. 201	R	P.E. 202	R
	17		17

## JUNIOR YEAR

Agro. 301 Soil Science	4	Agro. 310 Soil Morphology	2
An.Sc. 303 Animal Nutrition	3	Econ. 203 Prin. of Economics	3
P.P.P. 313 Intr. to Plant Physiology	3	Gen. 301 Genetics	4
R.S. 303 Agrostology	3	R.S. 315 Vegetation Eval. Methods	3
R.S. 314 Prin. of Range Mgmt.	3	R.S. 316 Grassland Ecology	3
	16	Elective*	3
			18

## SENIOR YEAR

Ag.En. 335 Water Control & Utilization	3	Ag.Ec. 422 Land Economics	3
R.S. 417 Synecology	3	An.Sc. 406 Beef Cattle Production	3
R.S. 481 Seminar	1	R.S. 415 Adv. Range Mgmt.	4
Elective*	11	R.S. 481 Seminar	1
	18	Elective*	7
			18

\*Elective hours will be chosen by the student in consultation with his faculty advisor in the following manner: Nine hours of course work are to be chosen from the area of writing and speaking skills, humanities, and social sciences. Twenty-one hours of course work must be elected in conference with the student's advisor.

### Curriculum in RECREATION AND PARKS

The curriculum in recreation and parks is designed to train students for professional positions in recreation and park administration and management. An increasing number of opportunities are available in federal, state and municipal parks, private recreational areas and as directors and developers of recreational facilities for private industry. The curriculum includes a broad range of subjects in the sciences and the humanities, as well as specific courses pertaining to resource use such as conservation, wildlife science, forestry, range science and soils. Courses in wildland recreation, park administration, campsite design, recreation development, landscape horticulture, and safety education provide students the professional courses to develop professional competence in this field.

## FRESHMAN YEAR

Biol. 107 Vertebrate Zoology	3	Biol. 101 Gen. Botany of Seed Plants	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	17		17

## SOPHOMORE YEAR

Biol. 102 Taxonomy of Flowering Plants	3	Ento. 201 Gen. Entomology	3
Econ. 203 Prin. of Economics	3	Govt. 206 American National Govt.	3
Flor. 206 Woody Ornamental Plants	3	H.E. 216 First Aid	1
For. 201 Dendrology	4	M.S. or A.S.	1
M.S. or A.S.	1	P.E. 221 Safety Education	2
Soc. 205 Prin. of Sociology	3	R.S. 205 Plant Ecology	3
W.S. 201 Wildlife Conservation & Mgmt.	3	Soc. 206 Social Institutions & Processes	3
P.E. 201	R	P.E. 202	R
	20		16

## JUNIOR YEAR

First Semester		Credit	Second Semester		Credit
Ag.En. 335	Water Control & Utilization	3	P.E. 310	Pool & Waterfront Mgmt.	3
Agro. 301	Soil Science	4	P.E. 326	Outdoor Education	3
R.P. 301	Prin. of Wildland Recreation	3	R.P. 302	Prin. of Park Administration	3
W.S. 202	Nat. Hist. of Vertebrates	3	W.S. 410	Conservation & Mgmt. of Fishes	3
Elective		4	Elective		5
		17			17

## SENIOR YEAR

Ag.Ec. 422	Land Economics	3	Acct. 409	Survey of Accounting Prin.	3
R.P. 401	Camp Area Development	3	Flor. 425	Landscape Maint. & Constr.	4
R.P. 402	Recreation Area Planning	3	R.P. 403	Recreation & Parks Mgmt.	3
Elective		7	Elective		6
		16			16

NOTE: Students in this curriculum must choose 9 hours of electives in writing and speaking skills and in the humanities.

Curricula in  
WILDLIFE SCIENCE

These curricula include work in all phases of fisheries and wildlife. At the beginning of the sophomore year, the student should elect one of the two options, fisheries or wildlife, because of difference in the basic sciences required. The junior and senior years are largely years of specialization.

These curricula are designed (1) to train individuals in the art of managing wildlife and fisheries, and of maintaining populations at levels consistent with good land-use practices and the desirability of the species involved: (2) to train for research in taxonomy, distribution, and ecology of fishes, reptiles, amphibians, birds, and mammals; and (3) to train for teaching at the high school and university levels. Opportunities are provided also, in cooperation with the Department of Journalism for training in the field of wildlife journalism. For students planning careers in research and/or teaching at the college level, an advanced degree will be required.

Upon completion of the wildlife science curriculum, graduates are prepared to enter occupations in the fisheries and/or wildlife fields, including management, research, teaching, and public relations. Those meeting Civil Service requirements are eligible for appointments with the United States Fish and Wildlife Service and other federal agencies. Also, graduates are eligible for employment by the various state game and fish commissions. A few positions are open from time to time as wildlife managers on private ranches and as writers of articles on outdoor life.

Wildlife Option<sup>3</sup>

## FRESHMAN YEAR

Biol. 101	Gen. Botany of Seed Plants	3	Biol. 102	Taxonomy of Flowering Plants	3
Chem. 101	Gen. Chemistry	4	Chem. 102	Gen. Chemistry	4
Engl. 103	Composition & Rhetoric	3	Engl. 104	Composition & Rhetoric	3
Hist. 105	Hist. of United States	3	Hist. 106	Hist. of United States	3
Math. 102	Algebra	3	Math. 103	Plane Trigonometry	3
M.S. or A.S.		1	M.S. or A.S.		1
P.E. 101		R	P.E. 102		R
		17			17

## SOPHOMORE YEAR

Biol. 107	Vertebrate Zoology	3	Biol. 108	Invertebrate Zoology	3
Engl. 203	Intr. to Literature	3	Chem. 232	Elem. Organic Chemistry	5
Govt. 206	American National Govt.	3	Engl. 210	Argumentation	3
M.S. or A.S.		1	M.S. or A.S.		1
Phys. 201	College Physics	4	Psy. 207	Gen. Psychology	3
W.S. 201	Wildlife Conservation & Mgmt.	3	Or		
P.E. 201		R	Soc. 205	Prin. of Sociology	3
		17	Elective		3
			P.E. 202		R
					18



## JUNIOR YEAR

Econ. 203	Prin. of Economics	3	Agro. 301	Soil Science	4
Ento. 313	Biology of Insects	3	R.S. 316	Grassland Ecology	3
Gen. 301	Genetics	4	W.S. 315	Herpetology	3
W.S. 311	Ichthyology (Fresh Water)	3	W.S. 408	Techn. of Wildlife Mgmt.	3
Elective		4	Elective		4
		17			17

## SENIOR YEAR

Spch. 403	Public Speaking	3	Engl. 301	Writing for Professional Men	
Stat. 406	Statistical Methods	3	Or		
W.S. 401	Gen. Mammalogy	3	Jour. 415	Agricultural Journalism	3
W.S. 403	Animal Ecology	3	W.S. 402	Gen. Ornithology	3
Elective		5	W.S. 416	Animal Population Dynamics	3
		17	Elective		8
					17

Fisheries Option<sup>4</sup>

## FRESHMAN YEAR

(Same as Wildlife Option, page 58)

## SOPHOMORE YEAR

First Semester		Credit	Second Semester		Credit
Biol. 107	Vertebrate Zoology	3	Biol. 108	Invertebrate Zoology	3
Chem. 223	Elem. Quantitative Analysis	3	Chem. 232	Elem. Organic Chemistry	5
Engl. 203	Intr. to Literature	3	Engl. 210	Argumentation	3
Govt. 206	American National Govt.	3	M.S. or A.S.		1
M.S. or A.S.		1	Phys. 201	College Physics	4
W.S. 201	Wildlife Conservation & Mgmt.	3	Elective		2
P.E. 201		R	P.E. 202		R
		16			18

## JUNIOR YEAR

Biol. 217	Comp. Anatomy of Vertebrates	3	Biol. 344	Embryology	3
Ento. 313	Biology of Insects	3	Spch. 403	Public Speaking	3
Gen. 301	Genetics	4	Stat. 406	Statistical Methods	3
W.S. 311	Ichthyology (Fresh Water)	3	W.S. 312	Ichthyology (Marine)	3
Elective		3	Elective		6
		16			18

## SENIOR YEAR

Biol. 435	Adv. Invertebrate Zoology	4	Ocn. 401	Intr. to Oceanography	3
Engl. 301	Writing for Professional Men	3	W.S. 410	Conservation & Mgmt. of Fishes	3
W.S. 403	Animal Ecology	3	W.S. 416	Animal Population Dynamics	3
W.S. 417	Biology of Fishes	3	Elective		9
Elective		4			18
		17			

- NOTES:
- Electives shall be selected and substitutions made with the advice of the Department Head.
  - At least 16 but not more than 24 credit hours of advanced courses in the student's major department shall be permitted toward requirements for graduation.
  - Majors in the Wildlife Science Option must participate in the summer field course, W.S. 300, or submit evidence of satisfactory summer employment as biologist's aid with a state game and fish commission, the U.S. Fish and Wildlife Service, or other suitable employment.
  - A student electing the Fisheries Option will be expected to spend the summer following the junior year at the Texas A&M Marine Laboratory, Galveston, Texas, during which he should normally enroll in the following courses: W.S. 312 (3 hours), W.S. 416 (3 hours), W.S. 400 (4 hours), and Stat. 406 (3 hours).
  - Majors who wish to qualify for a teacher's certificate will substitute Psy. 302.

# *The College of Engineering*

## ADMINISTRATIVE OFFICERS

F. J. Benson, B.S., M.S. ....	Dean
R. E. Wainerdi, B.S., M.S., Ph.D. ....	Associate Dean
J. G. McGuire, B.S., M.S. ....	Assistant Dean
C. H. Ransdell, B.S., M. Ed., Sc.D. ....	Assistant Dean

## GENERAL STATEMENT

Engineering has been described as the art of applying the mathematical and natural sciences to the practical solution of the technological problems of civilization. Since the Industrial Revolution, engineers — working both in industry and in private practice — have contributed greatly to raising the standards of living for mankind. In recent years particularly industry, through the support of the engineering profession, has made great strides in technological developments. This accelerating pace of advancement has created the demand for an ever increasing number of capable young people in engineering. At the present time over two-thirds of all technical and a large percentage of the supervisory and administrative positions in industry are manned by engineers.

Since, as noted previously, engineering is a creative art based on science, an engineer may either be a “practicing engineer” or an “engineering scientist”, depending upon his professional activity. It is the engineer’s responsibility to utilize known laws of science and mathematics in ways to make them valuable to mankind. Engineers often work as members of a team to solve a problem or to produce a desired product. Individually or as a group the engineer’s responsibility in the production of an item may include steps as follows: the conception of the idea, the design for production, the selection of materials to be used, the determination of markets, the design or selection of machines for production, and the control of costs to ensure a profit.

The contribution of engineers to technological advances in things that affect our everyday living is greater than is often realized. The comforts and conveniences in our homes, the availability of running water, electricity, gas and sewage disposal systems are things that are just taken for granted. The fine automobiles, the excellent highways, the luxurious airplanes, the long range missiles and the orbiting satellites are a few concrete evidences of the work of the engineer. Sometimes known principles and physical laws lie idle and are unused for many, many years before the engineer utilizes them and builds the equipment to make them useful.

The College of Engineering, through its several curricula, offers broad programs of education in the engineering sciences that are designed to develop the student’s abilities and qualities to enable him to enter into and advance with the profession of engineering, and to lead a useful and happy life. Although these programs include as their main core the fundamentals of engineering science and the basic materials related thereto, they also include subjects from the social and humanistic sciences. It is expected that a student who conscientiously applies himself to and successfully completes one of these broad engineering programs not only will be technically trained but also humanly and socially educated.

For the high school graduate, the minimum requirements for university entrance are listed in the earlier pages of this bulletin. On the other hand, for students who are still in high school and who are in a position to plan their high school program in preparation for engineering, the importance of mathematics and science cannot be overemphasized. The best high school background in mathematics would include four years of high level mathematics, with emphasis upon algebra, geometry, and trigonometry.

Also, a student should take as much natural and physical science as possible in high school. Of the sciences, chemistry and physics are of particular importance in the preparation for the study of engineering.

## CURRICULA

### School of Architecture

Architecture (Five Year Program)  
 Architectural Construction  
 Landscape Architecture

### Engineering

Aerospace Engineering	Industrial Engineering
*Agricultural Engineering	Industrial Technology
Chemical Engineering	Mechanical Engineering
Civil Engineering	Petroleum Engineering
Electrical Engineering	Petroleum Engineering
Geological Engineering	(Five Year Program)
Industrial Distribution	
Industrial Education	
Industrial Arts Teacher	
Education Option	
Vocational Industrial Teacher	
Education Option	

### Five-Year Combined Degree Plans

Students who are interested in two areas of engineering or a business foundation to complement their engineering curriculum may pursue programs which lead to two Bachelor's degrees in five years. The following curricula are examples; students interested in other possible combinations should consult with the Dean of Engineering.

Chemical Engineering—Business  
 Civil Engineering—Business  
 Geology—Petroleum Engineering  
 \*\*Industrial Engineering  
 Petroleum Engineering—Business  
 Petroleum Engineering—Chemical Engineering  
 Petroleum Engineering—Geological Engineering  
 Petroleum Engineering—Mechanical Engineering

Students may also pursue a five year program combining full professional training with a broad general education to qualify for two degrees, the Bachelor of Science degree in a professional field and the Bachelor of Arts degree in one of the liberal arts curricula (See page 87, "Combined Degree Plan.").

## INDUSTRY-UNIVERSITY COOPERATIVE EDUCATION

Cooperative education is a study-work plan of education in which a student alternates periods of attendance in college or university with periods of employment in industry related to his major. This program has been used successfully for many years by colleges and universities throughout the United States. In 1906, Herman Schneider at the University of Cincinnati initiated the first known cooperative education program. Others who have adopted the plan agreed with his belief that a combination of industrial experience and college study would make education richer and more meaningful.

Although Texas A&M has had a somewhat informal cooperative education program involving a few students for several years, it has been only recently that there has been a marked increase of interest and participation. To match this desire of students to find a means of paying for their education as they go, governmental agencies and private industries have provided increasing numbers of engineering-oriented job opportunities for cooperative education students. The students involved in these programs

\*Administered jointly by the Colleges of Agriculture and Engineering.

\*\*A degree of Bachelor of Science in Industrial Engineering may be awarded on the basis of the student's completing the requirements for the degree of Bachelor of Science in Aerospace, Chemical, Civil, Electrical, Mechanical, or Petroleum Engineering and additional required courses.



have reported enthusiastically of their experiences. The interest of both students and industry leads us to believe that there will be an increasing number of students at Texas A&M following this plan of education. The plan is a year-round study-work program, with short vacations between periods, that makes it possible with careful planning for a cooperative education student to complete a regular eight-semester Bachelor of Science degree program in one semester or one summer beyond four years.

Those whose wish additional information concerning this program should write the Registrar or the Office of the Dean of Engineering.

### NUCLEAR PROGRAM

The University offers Master of Science and Ph.D. degrees in Nuclear Engineering. An explanation of these plans appears under advanced study.

### ADVANCED STUDY

As the knowledge required for advanced engineering design in industry increases, more and more students are finding it desirable to go beyond the usual four-year course. Much of the design in industry today follows the research mode of procedure, the procedure predominantly used in graduate study. Consequently, there has been a growth in graduate study to satisfy the demands of industry for engineers with greater scientific knowledge and research ability. In the future, industry, colleges and universities, and governmental agencies will carry on more and more research, and, therefore, there will continue to be a great demand for engineers with graduate training through the doctorate. It should be pointed out, however, that graduate study is available only to those with more than average ability.

Students who are interested in pursuing one of these graduate programs should take the regular undergraduate program in Aerospace Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, Industrial Engineering, Mechanical Engineering, Petroleum Engineering, Chemistry, Mathematics, or Physics. The following are recommended as electives for the undergraduate program, with the most important listed first. These courses should be taken only after consultation with the head of the student's major department.

Physics 311 Quantum Physics

Nuclear Engineering 401 Nuclear Engineering

Nuclear Engineering 402 Industrial Applications of Radioisotopes

An AGN-201 Nuclear Training Reactor is available for use in the nuclear technology work. The 5 megawatt research reactor in the Texas A&M Nuclear Science Center is available for student training and research.

## SCHOOL OF ARCHITECTURE

### Curriculum in ARCHITECTURE

Architecture is the creation of physical space within which people live, work, play, and worship. It is a profession which is dedicated to the betterment of the total man-made physical environment. The architect, therefore, must not only be able to analyze the general objectives, the specific needs and requirements of the individual or community, but to direct and coordinate the various building operations from design conception to completion of a project.

The School of Architecture offers a program designed to provide young men with a broad and balanced background of fundamental training for professional careers in architecture. The students are encouraged to develop sensibly and to apply their acquired knowledge and skills to solutions of the social and architectural problems of contemporary society. While they are developing their creative abilities, they are encouraged to acquire full recognition of their professional responsibilities to society.

The curriculum is arranged to integrate the technical aspects of materials, equipment, and construction, as well as the social and cultural aspects of art and history of architecture, with its core program in architectural design. The design courses are further strengthened with other related courses in graphic arts, landscape architecture, working drawings, specifications, and professional practice. Design is taught in a series of stages, beginning with basic design in the first and continued through all years as defined in the courses of instruction. The students are assigned problems to

be solved individually or by teams. Individual guidance and criticism are given by the instructor, accompanied with group discussions, lectures, and demonstrations. Student work is reviewed and judged by a jury of teachers, practicing architects, and on some occasions, the specialists in a particular project.

The School of Architecture is a member of the Association of Collegiate Schools of Architecture and is on the approved list of schools accepted by the Texas Board of Architectural Examiners. Its curriculum in architecture is five years in length, leading to a degree of Bachelor of Architecture. The curriculum is accredited by the National Architectural Accrediting Board. Graduates of this program often continue their education in advanced degrees in architecture or in the field of city and regional planning.

## FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Arch. 101 Design I	2	Arch. 102 Design I	2
Arch. 115 Architectural Graphics	2	Arch. 116 Architectural Graphics	2
Engl. 103 Composition & Rhetoric	3	Educ. 106 Survey of Man's Knowledge	1
Hist. 105 Hist. of United States	3	Engl. 104 Composition & Rhetoric	3
I.Ed. 108 Carpentry & Mill Work	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 116 Plane Trig. & Anal. Geometry	4
M.S. or A.S.	1	M.E. 101 Engr. Problems	1
P.E. 101	R	M.S. or A.S.	1
	17	P.E. 102	R
			17

## SOPHOMORE YEAR

Arch. 201 Design II	4	Arch. 202 Design II	4
Arch. 205 Graphic Art	2	Arch. 206 Graphic Art	2
Arch. 227 Structural Principles	3	Arch. 228 Elements of Mechanics	3
Arch. 253 Technology of Materials	2	Arch. 254 Technology of Materials	2
Engl. 210 Argumentation	3	C.E. 206 Plane Surveying	1
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 201 College Physics	4	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	19		17

## JUNIOR YEAR

Arch. 301 Design III	5	Arch. 302 Design III	5
Arch. 305 Graphic Art	2	Arch. 306 Graphic Art	2
Arch. 325 Survey of Contemp. Art	1	Arch. 326 Survey of Contemp. Art	1
Arch. 327 Basic Structures	3	Arch. 328 Steel Structures	3
Arch. 335 Mech. & Elec. Equipment for Bldgs.	3	Arch. 336 Mech. & Elec. Equipment for Bldgs.	3
Arch. 339 Art & Civilization	3	Arch. 340 Hist. of Architecture	3
	17		17

## SENIOR YEAR

Arch. 401 Design IV	5	Arch. 402 Design IV	5
Arch. 427 Concrete Structures	3	Arch. 428 Roof Structures	3
Arch. 439 Hist. of Architecture	3	Arch. 440 Hist. of Architecture	3
Engl. 371 Great Books	3	Arch. 454 Specif. & Work. Drawings	3
Elective	3	Elective	3
	17		17

## SUMMER WORK

Arch. 500; Summer Practice, twelve weeks, required

## FIFTH YEAR

Arch. 501 Design V	5	Arch. 502 Design V	5
Arch. 527 Structural Systems	3	Arch. 528 Structural Systems	3
Arch. 556 City Planning	3	Arch. 554 Professional Practice	2
Land. 411 Lands. Design for Arch. & Engr.	3	Arch. 581 Seminar	1
Elective	3	Govt. 206 American National Govt.	3
	17	Spch. 403 Public Speaking	3
			17

NOTE: Electives may be selected from Groups I, II, and III listed on page 81.

## Curriculum in ARCHITECTURAL CONSTRUCTION

The construction of buildings is one of the major industries in the country. Proper training in technical studies of construction methods, materials, structural systems, soils, equipment, cost estimating, business and real estate laws, and labor management forms a good background for those going into the building construction field.

The intent of this program is to offer a curriculum of study specifically designed to supply college educated and trained personnel for the rapidly expanding building construction industry. This program is not intended to produce graduates who will be following either Engineering or Architecture as a profession. Its purpose is to educate a student who wishes to enter into one of the many facets of the building industry.

The construction program offered by the School of Architecture is designed to prepare young men for this field. Students take courses along with Architecture, Engineering, and Business students and become familiar with these related fields.

The program is four years in length and leads to a degree of Bachelor of Science in Architectural Construction may apply for a Master's degree program in specialized construction industry as draftsmen, estimators, superintendents of construction, and ultimately develop their own firms as building contractors. Graduates also enter into sales of building materials and equipment.

Students who successfully complete the degree program for a Bachelor of Science in Architectural Construction may apply for a Master's degree program in specialized areas in related fields, pending approval by the Dean of the Graduate College and the Chairman of the School of Architecture.

Students in this program become members of a very active student chapter of the Associated General Contractors. Through participation in this organization, the students are kept informed of current developments in this field.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Arch. 115 Architectural Graphics	2	Arch. 116 Architectural Graphics	2
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
I.Ed. 108 Carpentry & Millwork	3	I.Ed. 107 Ind. Materials & Mfg. Proc.	3
Math. 102 Algebra	3	Math. 121 Analytic Geom. & Calculus	4
Math. 103 Plane Trigonometry	3	M.E. 101 Engr. Problems	1
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	18		17

### SOPHOMORE YEAR

Arch. 227 Structural Principles	3	Arch. 228 Elements of Mechanics	3
Arch. 253 Technology of Materials	2	Arch. 254 Technology of Materials	2
Engl. 210 Argumentation	3	C.E. 201 Plane Surveying	4
Govt. 206 American National Govt.	3	Engl. 301 Writing for Professional Men	3
Mgmt. 211 Business Law	3	M.S. or A.S.	1
M.S. or A.S.	1	Phys. 202 College Physics	4
Phys. 201 College Physics	4	P.E. 202	R
P.E. 201	R		17
	19		

### JUNIOR YEAR

Acct. 409 Survey of Accounting Prin.	3	Arch. 328 Steel Structures	3
Arch. 327 Basic Structures	3	Arch. 336 Mech. & Elec. Equipment for Bldgs.	3
Arch. 335 Mech. & Elec. Equipment for Bldgs.	3	C.E. 315 Strength of Materials Lab.	1
Econ. 203 Prin. of Economics	3	Geol. 320 Geol. for Civil Engr.	3
I.En. 401 Survey of Industrial Engr.	3	I.En. 412 Labor & Industry	3
Elective	2	Elective	3
	17		16

### SUMMER WORK

Arch. 500; Summer Practice, twelve weeks, required



## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Arch. 427 Concrete Structures	3	Arch. 428 Roof Structures	3
Arch. 439 Hist. of Architecture	3	Arch. 440 Hist. of Architecture	3
Arch. 454 Specif. & Working Drawings	3	C.E. 348 Engr. Economy	2
Arch. 554 Professional Practice	2	C.E. 408 Municipal Administration	3
C.E. 473 Cost Estimating	3	C.E. 478 Constr. Plant & Meth.	3
Fin. 428 Real Estate Titles & Conveyances	3	Elective	3
	17		17

NOTE: Electives may be selected from Groups I, II, and III listed on page 81.

Curriculum in  
LANDSCAPE ARCHITECTURE

Landscape architecture is a profession dealing with the art and science of arranging land and water forms and the spaces and objects thereon for the purpose of securing the greatest benefit in human use and enjoyment. As in architecture, it is a creative profession concerned with proper and pleasing physical environment. The creative ability of the landscape architect is expressed by his arrangement of forms, the spaces which he produces with land areas for various purposes, his setting of buildings and structures in relation to surrounding topography, and by his use of plant materials, such as trees, shrubs, grasses, and flowers in his design. He must possess an artistic sense, an engineering ability, be skilled in design, have a fundamental knowledge of plant science, and be knowledgeable of the basic elements of land, water, vegetation, and the forces of nature.

The curriculum has been arranged to provide courses which will develop the student logically. Its major direction consists of courses in design, the supplementary courses in plant materials, construction, architecture, graphic arts, planning, etc., forming a broad background, together with essential technical training for the professional practice of landscape architecture.

Since the students are physically located with those in architecture, an opportunity is afforded through collaborative problems to establish working relationships which are important to their future professional careers.

The program is four years in length, leading to a degree of Bachelor of Science in Landscape Architecture. Graduates are employed in private practice; by city, state, and regional planning departments; or by city, state, or national park systems. Other opportunities exist in teaching, research, and extension work. Graduates in landscape architecture are prepared for advanced study in city or regional planning.

## FRESHMAN YEAR

Biol. 101 Gen. Botany of Seed Plants	3	Biol. 102 Taxonomy of Flowering Plants	3
Engl. 103 Composition & Rhetoric	3	Chem. 106 Gen. Chemistry	4
Hist. 105 Hist. of United States	3	Engl. 104'' Composition & Rhetoric	3
Math. 102 Algebra	3	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	Math. 103 Plane Trigonometry	3
Elective	3	M.E. 101 Engr. Problems	3
P.E. 101	R	M.S. or A.S.	1
	16	P.E. 102	R
			18

## SOPHOMORE YEAR

Arch. 101 Design I	2	Arch. 102 Design I	2
Arch. 115 Architectural Graphics	2	Arch. 116 Architectural Graphics	2
Arch. 253 Technology of Materials	2	Arch. 254 Technology of Materials	2
C.E. 201 Plane Surveying	4	Econ. 203 Prin. of Economics	3
Engl. 210 Argumentation	3	Flor. 307 Landscape Plant Materials	3
Flor. 206 Ornamental Plants	3	Land. 201 Hist. of Landscape Design	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 201	R	P.E. 202	R
	17		16

JUNIOR YEAR

First Semester		Credit	Second Semester		Credit
Arch. 205	Graphic Art	2	Arch. 206	Graphic Art	2
Arch. 339	Art & Civilization	3	Flor. 425	Land. Maint. & Construction	4
Engl. 301	Writing for Professional Men	3	Govt. 206	American National Govt.	3
Land. 304	Landscape Construction	3	Land. 305	Planting Design	2
Land. 320	Landscape Design I	4	Land. 321	Landscape Design II	4
Elective		2	Elective		2
		17			17

SUMMER WORK

Land. 300 (Summer Practice, 10 Weeks)

SENIOR YEAR

Arch. 305	Graphic Art	2	Arch. 306	Graphic Art	2
Arch. 325	Survey of Contemp. Art	1	Arch. 326	Survey of Contemp. Art	1
Flor. 319	Exotic Plants	3	Arch. 554	Professional Practice	2
Land. 404	Landscape Construction	3	Arch. 556	City Planning	3
Land. 420	Landscape Design III	6	Land. 421	Landscape Design IV	6
Spch. 403	Public Speaking	2	Elective		3
		17			17

NOTE: Electives may be selected from Groups I, II, and III listed on page 81.

Curricula in  
ENGINEERING

With the exception of industrial distribution, industrial education, and industrial technology, all curricula in engineering are identical in the freshman year. Students who expect to enter engineering curricula and are not thoroughly grounded in the fundamentals of algebra and trigonometry are urged to attend a six-week term of summer school prior to the fall semester of the freshman year and take courses in algebra and trigonometry equivalent to Math. 102 and 103 at Texas A&M University. Those students who are not proficient in algebra and trigonometry and who are unable to attend summer school should omit Math. 121 and Hist. 105 from their fall semester schedule and take Math. 102 and 103. Math. 121 should be taken in the spring semester and Math. 122 and Hist. 105 in summer school after the freshman year. It is desirable for the student to resume the regular schedule as soon as possible.

FRESHMAN YEAR

Chem. 101	Gen. Chemistry	4	Chem. 102	Gen. Chemistry	4
E.G. 105	Engineering Graphics	2	E.G. 106	Descriptive Geometry	2
Engl. 103	Composition & Rhetoric	3	Engl. 104	Composition & Rhetoric	3
Hist. 105	Hist. of United States	3	Math. 122	Calculus	4
Math. 121	Analytic Geom. & Calculus	4	M.S. or A.S.		1
M.S. or A.S.		1	Phys. 218	Mechanics & Heat	4
P.E. 101		R	P.E. 102		R
		17			18

Curriculum in  
AEROSPACE ENGINEERING

Aerospace engineering is described as the technical activities associated with the development of aerospace vehicles. These include research, analysis, and design in several technical specialties such as aerodynamics, dynamics of aircraft, structures, properties of materials and propulsion.

Aerospace engineering graduates are employed in aerospace industry, government research laboratories, and equipment manufacturing companies in Texas and elsewhere. A considerable number enter the military services as engineering officers. Aerospace engineering graduates are also well qualified for positions in other fields of engineering, since men trained in aerodynamics and the design of high-strength, light-weight structures are in demand in many industries.

The Aerospace Engineering Department has excellent facilities in the Engineering Building on the campus and at the University-owned Easterwood Airport. Facilities on the campus include a supersonic wind tunnel, an instructional low-speed wind tunnel, a structures laboratory, a materials and process laboratory, and complete shop facilities. The Aeronautical Laboratories, including the large wind tunnel, are located at Easterwood Airport. A Gas Dynamics Laboratory and a Propeller Test Facility are located at the Research Annex.

The four-year undergraduate curriculum in aerospace engineering leading to the degree of Bachelor of Science includes sound preparation in mathematics, physics, chemistry, English, and mechanics. The junior and senior years are devoted largely to the professional courses in aerodynamics, aerospace structures, aerospace power plants, and aerospace vehicle design. The opportunity to elect courses in a desired specialty is provided in the senior year.

### FRESHMAN YEAR

(See page 66)

### SOPHOMORE YEAR

First Semester		Credit	Second Semester		Credit
Aero. 201	Intr. to Aerospace Engr.	4	C.E. 305	Mechanics of Materials	3
Hist. 106	Hist. of United States	3	Econ. 203	Prin. of Economics	3
Math. 307	Calculus	3	Math. 308	Differential Equations	3
M.E. 212	Engr. Mechanics	3	M.E. 313	Engr. Mechanics	3
M.S. or A.S.		1	M.S. or A.S.		1
Phys. 219	Sound, Light, Electricity	4	Phys. 220	Modern Physics	4
P.E. 201		R	P.E. 202		R
		18			17

### JUNIOR YEAR

Aero. 301	Theoretical Aerodynamics	4	Aero. 303	High Speed Aerodynamics	4
Aero. 304	Elem. Aero. Structures	3	Aero. 306	Strength of Aerospace Materials	3
Aero. 312	Materials Science	3	Aero. 316	Aerospace Propulsion I	3
Aero. 320	Numerical Methods	3	E.E. 307	Electrical Circuits	4
M.E. 323	Thermodynamics	4	M.E. 338	Kinematics & Mach. Design	3
		17			17

### SENIOR YEAR

Aero. 405	Aerospace Structures	3	Aero. 401	Aerospace Vehicle Design	4
Aero. 417	Aerospace Propulsion II	3	Govt. 206	American National Govt.	3
Aero. 481	Seminar	1	Technical Elective		6
Technical Elective		6	Elective (Humanities or Social Science)		3
Elective (Humanities or Social Science)		3			16
		16			

- NOTES: 1. At least one of the technical electives in the senior year must be selected from Group A.  
 2. Technical electives for aerospace engineering include the following courses:  
 Group A: Aero. 419, 420, 421, 423, 435, 472, 475, 477; S.M. 468, 469.  
 Group B: E.E. 331; Math. 405; M.E. 340; N.E. 401; Phys. 317, 421.

### Curriculum in AGRICULTURAL ENGINEERING

(See page 41 for a discussion of this curriculum.)

### Curriculum in CHEMICAL ENGINEERING

Chemical engineering is that branch of engineering concerned with the development and application of manufacturing processes in which chemical or certain physical changes of materials are involved. These processes may usually be resolved into a coordinated series of unit physical operations and unit chemical processes. The work of the chemical engineer is concerned primarily with the design, construction, and operation of equipment and plants in which series of these unit operations and processes are applied. Chemistry, physics, and mathematics are the underlying sciences of chemical engineering, and economics is its guide in practice.



Chemical engineering became a separate division of engineering with the growth of strictly chemical industries, and it is now recognized as one of the important divisions of engineering, dealing with combustion of fuels, heat treatment of metals and alloys, the preparation of water for potable and industrial use, the refining of petroleum, processing of vegetable oils, the development of electric furnace products, Portland cement, lime gypsum, plaster, heavy chemicals, soaps, rubber, corn products, textiles, paper, artificial leather and silks, food products, and other products.

The work of the chemical engineer is the changing of raw materials into finished products with the greatest efficiency and economy. He substitutes a rigid control of processes for guess work and uncertainty and increases the productivity of labor by supplying more efficient processes where the standard and quality of the finished product are revised and the amount of seconds and rejections is reduced. The chemical engineer must also be able to modify a process in order to adapt it to commercial conditions and to select his material for construction with special reference to its use. His work is distinct from that of the chemist on the one hand and the mechanical engineer on the other, though he must have a thorough training in both chemistry and engineering.

The curriculum in chemical engineering is planned to prepare students for the design, construction, and operation of industries in which materials undergo chemical and physical change. The unit operations, such as fluid flow, heat flow, evaporation, drying, distillation, gas absorption, filtration, crushing and grinding, and size separation are basic studies that may be applied to any industry. General chemical processes are also included in the laboratory and classroom work. Research in both of these divisions is fostered by cooperative projects with the Texas Engineering Experiment Station and industrial organizations of the State.

As chemical engineering treats the processes whereby materials undergo a chemical and physical change, it is apparent that a large number of diversified industries have use for the chemical engineer, not only in the operation and control of processes but in the design of special equipment. Many chemical engineers enter the research laboratory, investigating processes in the laboratory and supervising their operation in the plants, considering carefully the controlling interest of cost as a factor in all industrial operations.

### FRESHMAN YEAR

(See page 66)

### SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Chem. 227 Organic Chemistry	4	Ch.E. 204 Elem. Chemical Engr.	3
Hist. 106 Hist. of United States	3	Chem. 228 Organic Chemistry	4
Math. 307 Calculus	3	C.E. 305 Mechanics of Materials	3
M.E. 212 Engineering Mechanics	3	Math. 308 Differential Equations	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	18		18

### JUNIOR YEAR

Ch.E. 304 Unit Operations	3	Ch.E. 314 Chemical Engr. Lab. I	1
Chem. 316 Quantitative Analysis	2	Ch.E. 423 Unit Operations	3
Chem. 319 Quant. Analysis Lab.	2	Chem. 324 Physical Chemistry	3
Chem. 323 Physical Chemistry	3	Chem. 326 Physical Chem. Lab.	1
Chem. 325 Physical Chem. Lab.	1	Engl. 210 Argumentation	3
Econ. 203 Prin. of Economics	3	Math. 417 Numerical Analysis	4
Elective (Humanities or Social Science)	3	M.E. 327 Thermodynamics	3
	17		18

### SENIOR YEAR

Ch.E. 409 Models of Chemical Processes	3	Ch.E. 426 Plant Design	4
Ch.E. 424 Unit Operations	3	Ch.E. 428 Industrial Chemical Processes	3
Ch.E. 429 Chemical Engr. Lab. III	1	Ch.E. 464 Ch.E. Kinetics	3
Ch.E. 433 Chemical Engr. Lab. II	1	E.E. 305 Elec. Circuits & Machines	4
Ch.E. 454 Ch.E. Thermodynamics	3	Govt. 206 American National Govt.	3
Ch.E. 461 Proc. Cont. & Instrumentation	2		
Ch.E. 481 Seminar	1		17
M.E. 403 Engineering Lab.	2		
Elective (Humanities or Social Science)	3		
	19		

## Curriculum in CIVIL ENGINEERING

The curriculum in civil engineering is organized to provide the graduate with a thorough grounding in the underlying principles of the basic sciences and engineering

During the first three years all civil engineering students follow a common program. In the fourth year the student is given an opportunity for moderate specialization through a suitable choice of three technical electives. With the assistance of his senior advisor, he may select a program of courses directed toward general civil engineering practice, or toward one of the following specific areas:

Coastal and Ocean Engineering	Materials Engineering
Construction Engineering	Public Works Engineering
and Construction Management	Structural Engineering and
Environmental Engineering	Structural Mechanics
Foundation Engineering and	Surveying and Photogrammetry
Soil Mechanics	Transportation Engineering
Hydraulic Engineering and	Urban Management
Fluid Mechanics	Urban Planning

The field of civil engineering is broad, and very often an individual finds that within a few years after graduation he is specializing in a given area. Although placing major emphasis in one of the programs listed does not restrict the graduate to that field, it does provide him an opportunity to develop a particular interest in greater depth. If graduate work is anticipated, this also affords the possibility of blending undergraduate and graduate programs of study.

For classes entering in September 1964 and thereafter

### FRESHMAN YEAR

(See page 66)

### SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
C.E. 201 Plane Surveying	4	C.E. 305 Mechanics of Materials	3
Hist. 106 Hist. of United States	3	Geol. 320 Geol. for Civil Engrs.	3
Math. 307 Calculus	3	Math. 308 Differential Equations	3
M.E. 212 Engineering Mechanics	3	M.E. 313 Engineering Mechanics	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	18		17

### SUMMER WORK

C.E. 300, Summer Surveying Practice, Credit 5

### JUNIOR YEAR

Aero. 312 Materials Science	3	C.E. 301 Water & Sewage Treatment	3
Aero. 320 Numerical Methods	4	C.E. 307 Highway Engr.	3
C.E. 306 Mechanics of Materials	2	C.E. 338 Hydraul. of Drainage Struct.	2
C.E. 311 Hydraulics	3	C.E. 346 Des. of Members & Connections	3
C.E. 336 Hydraulics Lab.	1	C.E. 365 Soil Mech. & Found.	3
C.E. 345 Theory of Structures	3	Engl. 210 Argumentation	3
C.E. 348 Engr. Economy	2		
	17		17

### SENIOR YEAR

C.E. 402 Water Supply & Sewage Practice	3	C.E. 443 Materials of Construction	3
C.E. 444 Reinforced Concrete Structures	4	C.E. 481 Seminar	1
Govt. 206 American National Govt.	3	E.E. 305 Elec. Circuits & Machines	4
M.E. 327 Thermodynamics	3	Elective (Social Science)	3
Technical Elective	3	Technical Elective	6
	16		17

## For the class graduating in 1966-67

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
C.E. 301 Water & Sewage Treatment	3	C.E. 348 Engr. Economy	2
C.E. 307 Highway Engr.	3	C.E. 402 Water Supply & Sewage Practice	3
C.E. 473 Cost Estimating	3	C.E. 443 Materials of Construction	3
C.E. 483 Anal. & Design of Structures	3	C.E. 481 Seminar	1
Technical Elective	3	E.E. 305 Electrical Circuits & Machines	4
	15	Technical Elective	3
			16

- NOTES: 1. Technical electives for civil engineering are to be selected from the following courses:  
 Fall Semester: C.E. 406, 408, 435, 457, 463, 473; Geol. 441; S.M. 468.  
 Spring Semester: C.E. 403, 417, 456, 458, 470, 478, 483, 486; S.M. 469.
2. Other technical electives may be selected with the recommendation of the senior advisor and the approval of the Head of the Department and the Dean of Engineering.

### Curriculum in ELECTRICAL ENGINEERING

The curriculum in electrical engineering is designed to give the student thorough training in the principles on which electrical phenomena are based. Instruction is provided in the basic sciences and mathematics that serve as the foundation for an engineering career.

The program for the first two years includes mathematics, physics, chemistry, and electrical science together with courses in English, history, economics, and other social and humanistic studies. The third year is devoted largely to the engineering sciences that are appropriate to all fields of electrical engineering. The program in the fourth year consists of studies of a professional nature illustrating the applications of engineering principles to typical problems in the fields of electronics, machinery, and communications. Elective courses in the fourth year permit the student to develop his interest in some particular field of electrical engineering.

Electrical engineering offers many opportunities to young men with suitable training. Graduates presently find employment in the aircraft and missile industry, public utilities, the petroleum industry, communications, and with electrical and electronic manufacturers. Electrical engineering education provides the necessary background for research, design and development, operations, management, and sales in the several industries in which electrical engineers work.

Students who expect to enroll in electrical engineering after attending another college or university should note that there is a six-semester sequence of electrical engineering courses in the curriculum. If the prerequisites are satisfied, transfer students may complete this sequence in two years and one summer session and should plan to transfer at the beginning of the summer session.

A student branch of the Institute of Electrical and Electronics Engineers has been organized on the campus, and membership in this organization serves to keep the student informed about current developments in the field of electrical engineering.

## FRESHMAN YEAR

(See page 66)

## SOPHOMORE YEAR

E.E. 201 Electricity & Magnetism	4	Econ. 203 Prin. of Economics	3
Hist. 106 Hist. of United States	3	E.E. 214 Elect. Circuit Theory	4
Math. 307 Calculus	3	Math. 308 Differential Equations	3
M.E. 212 Engr. Mechanics	3	M.E. 313 Engr. Mechanics	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	18		18

NOTE: Transfer students who have completed 68 acceptable credits of college or university work and lack no more than 14 credits of courses required in the sophomore year may attend both summer terms (12 weeks) and arrange a schedule to complete the degree program in four additional semesters. Such students should confer with the departmental advisor before enrolling in the summer session.



## JUNIOR YEAR

First Semester	Credit	Second Semester	Credit
C.E. 305 Mechanics of Materials	3	E.E. 322 Elect. & Magnetic Fields	3
E.E. 323 Elect. Circuit Theory	3	E.E. 324 Elect. & Circuit Theory	3
E.E. 325 Electronics	3	E.E. 326 Electronic Circuits	3
E.E. 327 Electrical Lab.	2	E.E. 328 Electrical Lab.	2
Engl. 231 <sup>1</sup> Survey of English Literature	3	E.E. 330 Elect. Machinery	3
Math. 407 <sup>2</sup> Complex Variables	3	Engl. 232 <sup>1</sup> Survey of English Literature	3
	17		17

## SENIOR YEAR

E.E. 401 Electrical Machinery	3	E.E. 404 Electrical Lab.	2
E.E. 403 Electrical Lab.	2	E.E. 420 Servo. & Control Devices	3
E.E. 432 Econ. Phases of Engr.	2	Govt. 206 American National Govt.	3
E.E. 439 Electronic Systems	3	M.E. 346 Fluid Mech. & Heat Transfer	3
M.E. 327 Thermodynamics	3	Technical Elective	3
Technical Elective	3	Elective <sup>3</sup>	3
	16		17

- NOTES: 1. Any course in English or American literature may be substituted for Engl. 231 and 232.  
 2. Math. 405, 409, 411, 414, 415, or 417 may be substituted for Math. 407.  
 3. Any junior or senior course from Group I or Group II, Humanities or Social Electives, page 81, may be chosen.  
 4. Technical electives in electrical engineering are to be selected from the following courses: E.E. 428, 448, 451, 452, 454, 456, 457, 459, 460; Geop. 435; M.E. 340; Phys. 405.

### Curriculum in GEOLOGICAL ENGINEERING

The curriculum in geological engineering provides training in the fundamental principles of engineering as well as specialized training in geology in a normal period of four years. Although this course is designed primarily for the student who expects to be employed as a petroleum geologist, the curriculum is such that the graduate is also qualified for work with railroads, public utilities, construction, ceramics, and other industries in which a knowledge of both geology and engineering is desirable.

Students interested in construction engineering and soil mechanics should consider obtaining a Bachelor of Science degree in Geological Engineering and a Bachelor of Science degree in Civil Engineering. Copies of a degree plan to satisfy requirements for both degrees may be obtained from the Civil Engineering or the Geology Department.

In addition to the above degree programs, five-year combination degree curricula may be arranged, such as geological engineering—business administration, geological engineering—petroleum engineering, or geological engineering—English for a student desiring a broader educational background.

## FRESHMAN YEAR

(See page 66)

## SOPHOMORE YEAR

Chem. 226 Chemical Calculations	2	Chem. 316 Quantitative Analysis	2
Geol. 201 General Geology	3	Chem. 318 Quant. Analysis Lab.	1
Geol. 203 Crystallography & Mineralogy	4	Geol. 204 Mineral. & Rock Study	2
Geol. 209 Intr. to Field Work	1	Geol. 210 Historical Geology	4
Math. 307 Calculus	3	M.E. 212 Engr. Mechanics	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	18		17

## JUNIOR YEAR

C.E. 305 Mechanics of Materials	3	Econ. 203 Prin. of Economics	3
Engl. 231 or 232 Survey of English Literature	3	Geol. 312 Structural Geology	3
Geol. 305 Invertebrate Paleontology	4	Geol. 317 Stratigraphic Paleontology	1
M.E. 313 Engr. Mechanics	3	Govt. 206 American National Govt.	3
Technical Elective <sup>1,4</sup>	3	Hist. 106 Hist. of United States	3
	—	M.E. 327 Thermodynamics	3
	16	Pet.E 312 Well Logging	1
			17

## SUMMER CAMP

Geol. 300, Field Geology, Credit 6

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Chem. 323 & 325 Physical Chem. & Lab.		E.E. 305 Elec. Circuits & Machinery	4
Or		Geol. 427 Stratigraphy	3
Math. 417 <sup>4</sup> Numerical Analysis	4	Geol. 482 Seminar	1
Geol. 315 Prin. of Sedimentation	3	Geology or Geophysics (elective <sup>3</sup> )	6
Geol. 481 Seminar	1	Elective (Humanities or Social Science)	3
Geology (elective <sup>2</sup> )	3		—
Geop. 435 Prin. of Geophys. Explor.	4		17
M.E. 344 Fluid Mechanics	3		
	18		

- NOTES: 1. Technical electives are to be selected from C.E. 365; Math. 308; Pet.E. 305, 307.  
 2. This geology elective may be satisfied by Geol. 303, 404, 406, or 431.  
 3. These electives may be satisfied by Geol. 304, 423, 425; Geop. 436, 446.  
 4. Students desiring training in programming and operating computers should take Math. 308 and 417 and I.E. 458.

Curriculum in  
INDUSTRIAL DISTRIBUTION

Industrial distribution prepares men for industrial technical sales. This program offers preparation in the methods of producing and distributing industrial products. It also provides an understanding of the personnel and human relations problems associated with the distribution of the products of our vast industrial and manufacturing system.

The program is oriented toward industrial and technical courses because the graduate will be selling industrial tools, equipment, and supplies to industrial centers and contractors. His relationships will be with executives, management, engineers, scientists, and craftsmen.

This is one of the few industrial distribution programs offered in the United States. Graduates of this four-year program receive the Bachelor of Science degree in Industrial Distribution.

## FRESHMAN YEAR

E.G. 105 Engineering Graphics	2	Chem. 106 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	2	E.G. 106 Descriptive Geometry	2
Hist. 105 Hist. of United States	3	Engl. 104 Composition & Rhetoric	3
I.Ed. 105 Wood Craft	3	Hist. 106 Hist. of United States	3
I.Ed. 107 Ind. Mat. & Mfg. Processes	3	Math. 116 Plane Trig. & Anal. Geom.	4
Math. 102 Algebra	3	M.S. or A.S.	1
M.S. or A.S.	1	P.E. 102	R
P.E. 101	R		—
	18		17

## SOPHOMORE YEAR

Engl. 210 Argumentation	3	Econ. 203 Prin. of Economics	3
I.Ed. 308 Study of Modern Industries	3	E.G. 127 Ind. Freehand Sketching	2
Math. 223 Diff. & Integral Calculus	4	H.E. 216 First Aid	1
M.E. 101 Engr. Problems	1	I.Ed. 106 Sheet Metal	3
M.E. 309 Mach. Prod. Techniques	1	I.Ed. 204 Dev. & Prac. in I.Ed.	3
M.S. or A.S.	1	M.E. 310 Mach. Prod. Techniques	1
Phys. 201 College Physics	4	M.S. or A.S.	1
Elective	2	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	19		18

## JUNIOR YEAR

Arch. 331 Mechanics & Materials	3	Aect. 409 Survey of Accounting Prin.	3
Govt. 206 American National Govt.	3	Engl. 301 Writing for Professional Men	3
I.Ed. 328 Ind. Accident Prevention	3	I.Ed. 304 Appl. Ind. Electricity	3
Jour. 321 Industrial Journalism	3	I.Ed. 326 Gen. Metalwork	3
Mktg. 321 Marketing	3	I.En. 302 Production Engr.	2
Elective	4	Mgmt. 211 Business Law	3
	19	Elective	1
			18

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
I.Ed. 404 Visual Aids for Ind. Subjects	2	I.Ed. 444 Ind. Distribution	3
I.Ed. 429 Foreman. & Supervision	3	I.Ed. 481 Seminar	1
I.Ed. 447 Elect. & Electronics	3	I.En. 412 Labor & Industry	3
Psy. 401 Industrial Psychology	3	Mktg. 435 Salesmanship	3
Spch. 403 Public Speaking	3	Mktg. 446 Mktg. Ind. Products	2
Elective	3	Elective	6
	17		18

NOTE: Electives for industrial distribution, industrial education, and industrial technology are to be selected from the general engineering electives shown on page 81 or from the following: Chem. 102; C.E. 201, 206, 208, 300; Educ. 426; E.G. 221; Geol. 205; I.Ed. 427; Jour. 315; Math. 104, 121, 209; M.E. 212; P.E. 221; Psy. 207, 305, 323; Soc. 304, 315.

### Curricula in INDUSTRIAL EDUCATION

#### Industrial Arts Teacher Education Option

This curriculum prepares men to teach Industrial Arts in the junior and senior high schools, technical schools, colleges, and universities.

Industrial arts includes such content areas as general shop, woodwork, metals, drafting, electricity, plastics, ceramics, leather, and other craft courses. The program of industrial arts teacher education provides excellent technical and professional background in the most modern laboratories and classrooms.

Students completing this four-year program receive the Bachelor of Science degree in Industrial Education and are qualified to apply for the appropriate teaching certificate from the Texas Education Agency.

Teacher education students may also qualify for a certificate to teach driver education in junior and senior high schools and in colleges and universities and private agencies by taking six semester hours of specified and approved courses under a program approved by the American Automobile Association and the Texas Education Agency.

## FRESHMAN YEAR

E.G. 105 Engineering Graphics	2	Chem. 106 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	E.G. 106 Descriptive Geometry	2
Hist. 105 Hist. of United States	3	E.G. 128 Method. of Ind. Reproduction	1
I.Ed. 105 Wood Craft	3	Engl. 104 Composition & Rhetoric	3
I.Ed. 107 Ind. Mat. & Mfg. Processes	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	18		17

## SOPHOMORE YEAR

Econ. 203 Prin. of Economics	3	E.G. 127 Ind. Freehand Sketch.	2
Engl. 203 Intr. to Literature	3	E.G. 221 Bldg. Constr. Drawing	2
I.Ed. 205 Ornamental Iron	3	I.Ed. 106 Sheet Metal	3
M.E. 101 Engr. Problems	1	I.Ed. 109 Cabinet Making	3
M.E. 309 Mach. Prod. Technique	1	I.Ed. 204 Dev. & Prac. in I.Ed.	3
M.S. or A.S.	1	M.E. 310 Mach. Prod. Technique	1
Phys. 201 College Physics	4	M.S. or A.S.	1
Elective	1	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	17		19

## JUNIOR YEAR

Engl. 301 Writing for Professional Men	3	Govt. 207 State & Local Govt.	3
Govt. 206 American National Govt.	3	I.Ed. 304 Appl. Ind. Electricity	3
I.Ed. 323 Meth. of Tchg. Mech. Drawing	2	I.Ed. 310 Course Making	2
I.Ed. 327 Ind. Arts Handcraft	3	I.Ed. 329 Adv. Cabinet Making	3
I.Ed. 334 Upholstery	2	I.Ed. 332 Plastics & Ceramics	2
Psy. 301 Educational Psychology	3	I.Ed. 336 Design in the Arts & Crafts	2
Elective	3	Elective	3
	19		18



## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
I.Ed. 301 Methods of Tchg. & Class Mgmt.	3	Educ. 444 Sec. School Curriculum	3
I.Ed. 326 Gen. Metalwork	3	I.Ed. 419 Lab. of Indust. Meth.	2
I.Ed. 404 Visual Aids for Ind. Subjects	2	I.Ed. 442 Superv. Tchg. in Ind. Arts	6
I.Ed. 406 Industrial Guidance	2	I.Ed. 481 Seminar	1
I.Ed. 447 Electricity & Electronics	3	Elective	5
Spch. 403 Public Speaking	3		
Elective	2		
	18		17

## Vocational Industrial Teacher Education Option

This program is designed for teachers, supervisors, directors, and consultants of vocational educational schools and classes of Texas. Students satisfying the requirements under this program may qualify as teachers under the State Plan for Vocational Education as specified by the Texas Education Agency.

The applicant for this program must have had at least five full years of skilled trade or industrial technical work experience with at least one year of continuous employment. The student who desires to graduate under this program must submit a written request accompanied by a statement of his employed practical experience. Upon the approval of the request by the Head of the Department and the Dean of Engineering, the student will be permitted to plan a program within the limit of the courses listed here.

Approved industrial experience may be evaluated in terms of academic credits and, if acceptable to the Head of the Department and to the Dean of the College of Engineering, may be used in the place of shop work on the basis of four credit hours for each year of industrial experience up to a maximum of twenty credits. Approved teaching experience may be credited as supervised teaching on the basis of two credit hours per year up to a maximum of six credits.

Graduates of this program will receive the Bachelor of Science degree in Industrial Education and may qualify for the appropriate teaching certificate as approved by the Texas Education Agency.

## REQUIRED COURSES

## GENERAL EDUCATION

	Minimum Credits
<b>Economics</b>	6
Econ. 203 Prin. of Economics .....	3
Economics (elective) .....	3
<b>English</b>	12
Engl. 103 Comp. & Rhetoric .....	3
Engl. 104 Comp. & Rhetoric .....	3
Engl. 203 Intr. to Literature .....	3
Engl. 210 Argumentation .....	3
<b>Government</b>	6
Govt. 206 American National Govt. ....	3
Govt. 207 State and Local Govt. ....	3
<b>History</b>	6
Hist. 105 Hist. of United States .....	3
Hist. 106 Hist. of United States .....	3
<b>Mathematics</b>	6
Math. 102 Algebra .....	3
Math. 103 Plane Trigonometry .....	3
<b>Sociology</b>	3
Sociology (elective) .....	3

## TECHNICAL

<b>Engineering Drawing</b>	4
E.G. 105 Engr. Graphics .....	2
E.G. 106 Descriptive Geometry .....	2
<b>Engineering Problems</b>	1
M.E. 101 Engr. Problems .....	1
<b>Shop Work</b>	24
Includes credit for industrial work experience	

## SCIENCE

<b>Chemistry</b>			<b>4</b>
Chem. 106 General Chemistry .....	4		
<b>Industrial Supervision or Management</b>			<b>3</b>
I.Ed. 429 Foreman. & Supervision .....	3		
Or			
I.En. 401 Surv. of Industrial Engr. ....	3		
<b>Modern Industries</b>			<b>3</b>
I.Ed. 308 Study of Mod. Ind. ....	3		
<b>Physics</b>			<b>8</b>
Phys. 201 College Physics .....	4		
Phys. 202 College Physics .....	4		

## MILITARY TRAINING

<b>Military or Air Science</b>		<b>4</b>
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## PROFESSIONAL EDUCATION

The courses listed below are the basic ones required by the Vocational Division of the Texas Education Agency for a vocational certificate.

<b>General Requirements</b>		<b>9</b>
I.Ed. 204 Dev. & Prac. in Ind. Educ. ....	3	
I.Ed. 301 Meth. of Tchg. & Class Mgmt. ....	2	
I.Ed. 310 Course Making .....	2	
I.Ed. 424 Org. of Instruct. Mat. ....	2	
Additional courses and related fields are listed below depending upon the certificate desired.		
<b>For Vocational Industrial Shop Teachers</b>	<b>6</b>	
Visual Aids for Industrial Subjects		
Methods of Introducing Industrial Organization and Management into Industrial Schools		
Or		<b>6</b>
<b>For Part-Time Cooperative Training Coordinators</b>	<b>6</b>	
Follow-up, Visitation, and Coordination in Part-Time Schools		
Related subjects in part-time cooperative programs		
<b>Supervised Teaching</b>		<b>6</b>
<b>Other general education courses suited to the needs of the student</b>		<b>8</b>

## ELECTIVE

<b>To be approved by the Head of the Department</b>	<b>26</b>
<b>TOTAL CREDITS</b>	<b>145</b>

## ELECTIVES

(Same as for Industrial Distribution, see page 73)

Curriculum in  
INDUSTRIAL ENGINEERING

Industrial engineering is the science of production. Just as the other branches of engineering use the laws of the physical sciences in the design and operation of a product, so does industrial engineering apply these same laws to the design, selection, and operation of the plant in which this product is produced. A major distinction between industrial engineering and other branches is that the industrial engineer must consider not only the behavior of inanimate objects as they are governed by physical laws, but also must include in his plan the behavior of people as they operate together in organizations, whether these organizations be simple or complex.

Although usually the industrial engineer is concerned with the production of a manufactured article, the same principles of scientific analysis, planning, and control which are effective in this field have been found to be quite useful in any activity where a large number of people work together. Thus, industrial engineers find employment in wholesale trade, in transportation, even in banks and insurance companies. Because of the increasing technical complexity of today's manufacturing operations, there is a rapidly increasing demand for the graduate who plans to make his career that of production control and supervision. Many industrial engineers now work in automation and electronic data processing.

### Four-Year Curriculum

The four-year curriculum leading to the Bachelor of Science degree in Industrial Engineering fills the above need by providing training in the basic engineering subjects of mathematics, physics, graphics, chemistry, and mechanics which are common to most engineering curricula. Beyond this, it gives students training in manufacturing processes, setting time standards, production control, quality control, tool engineering, cost analysis, factory design, industrial relations, programming of digital computers, and operations research. This combination well equips the graduate to enter the profession of industrial engineering or production management.

### Five-Year Curriculum

Since there is an insistent and growing demand for men versed in the fundamentals of other branches of engineering and also in the principles of executive control, there are offered five-year curricula designed for students who wish training in industrial and in aerospace, chemical, civil, electrical, mechanical, or petroleum engineering. Thus, in five years, the student may complete the requirements for two Bachelor of Science degrees, one in his preferred specialty of engineering and the other in the field of industrial engineering. The completion of the requirements for these two degrees admirably prepares the engineering graduate for rapid advancement.

Students desiring to work toward the two degrees should consult with the Director of Admissions and Registrar or the Head of the Industrial Engineering Department for the course requirements. The industrial engineering courses may be taken either concurrently with courses in any of the above branches, which will enable the students to get both degrees at the same time, or may be taken after the first degree is granted. Ordinarily two semesters of additional work are sufficient to complete the requirements for the second degree in industrial engineering.

### FRESHMAN YEAR

(See page 66)

### SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Engl. 210 Argumentation	3	Econ. 203 Prin. of Economics	3
Hist. 106 Hist. of United States	3	Govt. 206 American National Govt.	3
Math. 307 Calculus	3	Mathematics (elective*)	3
M.E. 212 Engr. Mechanics	3	M.E. 310 Mach. Prod. Techniques	1
M.E. 309 Mach. Prod. Techniques	1	M.E. 313 Engr. Mechanics	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	18		18

### JUNIOR YEAR

Acct. 409 Survey of Accounting Prin.	3	Acct. 430 Cost Accounting Survey	3
I.En. 302 Production Engr.	2	C.E. 305 Mechanics of Materials	3
I.En. 414 Stat. Control of Qual.	3	C.E. 315 Strength of Mat. Lab.	1
I.En. 458 Prog. of Digital Comp.	4	I.En. 404 Motion & Time Study	3
M.E. 323 Thermodynamics	4	I.En. 420 Intr. to Oper. Res.	3
M.E. 337 Kinematic Drawing	1	M.E. 344 Fluid Mechanics	3
	17		16

### SENIOR YEAR

E.E. 307 Elect. Circuits	4	E.E. 308 Elect. Machinery	3
Engl. 301 Writing for Professional Men	3	I.En. 412 Labor & Ind.	3
I.En. 415 Production Control	2	I.En. 416 Factory Layout	3
I.En. 453 Tool Engr.	3	I.En. 485 Spec. Prob. in Ind. Engr.	2
M.E. 340 Phys. Metallurgy	3	Technical Elective	3
Technical Elective	3	Elective (Humanities or Social Science)	3
	18		17

- NOTES: 1. The mathematics elective is to be selected from Math. 308, 414, or 417.
2. The student should observe that the technical electives in industrial engineering may be used for obtaining a better background in statistics, accounting, or economics. Some technical subjects are available for those so inclined. Technical electives are to be selected from the courses listed below: B.Ana. 304, 337; Econ. 311, 318; E.E. 325, 331\*, 420; E.G. 209; Fin. 341, 420; I.Ed. 328; I.En. 401, 485; Jour. 321; Mgmt. 211, 363, 459; Math. 308, 411, 414, 417; M.E. 338\*\*, 436, 445, 446, 457; N.E. 401; Psy. 303, 401, 408; Stat. 406.

\*May be used for E.E. 308 and 1 hour of technical elective.

\*\*May be used for M.E. 337 and 2 hours of technical elective.



## Curriculum in INDUSTRIAL TECHNOLOGY

Industrial technology prepares men for industrial positions in industrial relations, safety (industrial accident prevention), supervision, production, and employee training. Careers in safety are generally available with casualty insurance companies as well as with many of the larger industries. Among the positions in safety are inspectors, specialists, coordinators, directors, and industrial accident prevention consultants.

The industrial technologist assists with technical details; uses tools and instruments; fabricates, operates and maintains; tests and performs scientific and technical operations; and reports on and carries out prescribed action. Interests and abilities determine the direction of specialization within this field. The graduate is awarded the Bachelor of Science degree in Industrial Technology.

### FRESHMAN YEAR

First Semester		Credit	Second Semester		Credit
E.G. 105	Engr. Graphics	2	Chem. 106	Gen. Chemistry	4
Engl. 103	Composition & Rhetoric	3	E.G. 106	Descriptive Geometry	2
Hist. 105	Hist. of United States	3	Engl. 104	Composition & Rhetoric	3
I.Ed. 105	Wood Craft	3	Hist. 106	Hist. of United States	3
I.Ed. 107	Ind. Mat. & Mfg. Processes	3	Math. 116	Plane Trig. & Anal. Geom.	4
Math. 102	Algebra	3	M.S. or A.S.		1
M.S. or A.S.		1	P.E. 102		R
P.E. 101		R			—
		18			17

### SOPHOMORE YEAR

Engl. 210	Argumentation	3	Econ. 203	Prin. of Economics	3
I.Ed. 308	Study of Mod. Industries	3	E.G. 127	Ind. Freehand Sketching	2
Math. 223	Diff. & Integral Calculus	4	H.E. 216	First Aid	1
M.E. 101	Engr. Problems	1	I.Ed. 106	Sheet Metal	3
M.E. 309	Mach. Prod. Technique	1	I.Ed. 204	Dev. & Pract. in Ind. Educ.	3
M.S. or A.S.		1	M.E. 310	Mach. Prod. Technique	1
Phys. 201	College Physics	4	M.S. or A.S.		1
Elective		2	Phys. 202	College Physics	4
P.E. 201		R	P.E. 202		R
		19			18

### JUNIOR YEAR

Arch. 331	Mechanics & Materials	3	Engl. 301	Writing for Professional Men	3
Govt. 206	American National Govt.	3	I.Ed. 304	Appl. Ind. Electricity	3
I.Ed. 328	Ind. Accident Prevention	3	I.Ed. 326	Gen. Metalwork	3
Jour. 321	Industrial Journalism	3	I.En. 302	Production Engr.	2
Elective		7	I.En. 401	Survey of Ind. Engr.	3
		—	Mgmt. 211	Business Law	3
		19	Elective		1
					18

### SENIOR YEAR

I.Ed. 404	Visual Aids for Ind. Subjects	2	Acct. 409	Survey of Accounting Prin.	3
I.Ed. 429	Foreman. & Supervision	3	I.Ed. 423	Anal. Procedure	2
I.Ed. 447	Elect. & Electronics	3	I.Ed. 438	Ind. Safety	3
Psy. 401	Industrial Psychology	3	I.Ed. 481	Seminar	1
Spch. 403	Public Speaking	3	I.En. 404	Motion & Time Study	3
Elective		4	I.En. 412	Labor & Industry	3
		18	Elective		2
					17

### ELECTIVES

(Same as for Industrial Distribution, see page 73)

## Curriculum in MECHANICAL ENGINEERING

The breadth of the field of mechanical engineering is such that extensive specialization in undergraduate work is impossible and undesirable. Industry needs mechanical engineers for such a variety of work that it is deemed wise to make the curriculum broad and fundamental.

Training in habits of accurate analysis and logical thinking, the prerequisites of a good engineer, is emphasized.

Fundamental theory courses are supplemented by laboratory work in production processes, testing, instrumentation, and experimentation. Laboratory courses are designed to instruct in methods rather than to develop extensive skills.

Some specialization is possible in that during the senior year the student may elect courses in such fields as air conditioning, automotive engineering, internal combustion engines, turbines, metallurgy, nuclear engineering, and data processing.

The work of professional mechanical engineers varies from general engineering to highly specialized fields. It logically falls under **design, construction and erection, operation and maintenance, research, administration, and sales.**

**Design engineers** may find their work to be that of original design of machines and associated equipment; design of operating assemblies of machines and equipment commercially available for desired manufacturing, or process jobs; redesign of existing equipment to make possible changes, to improve economy, safety, and appearance.

**Construction and erection engineers** may be responsible for assembling and fabricating entire plants and putting them into operation. They must be able to use engineering drawings, plans and specifications, and to do supplementary design work.

**Operation and maintenance engineers** are in charge of plant performance and upkeep. They must be capable of securing profitable operation and of the supervision of plant personnel.

**Research engineers** are called on for an endless variety of investigations. They must have inquiring minds, initiative, patience, thorough knowledge of the fields in which they work, and the ability to analyze and correlate the results obtained. For the research man, graduate study is recommended.

Many engineers who have the leadership ability, personality, tact, and initiative become **administrators and executives.**

**Sales engineers** are probably as much in demand as any other group.

Among the industries that employ a large number of mechanical engineers are: air conditioning, aircraft, aerospace, automotive, chemical, food, paper, power, petroleum, refrigeration, and general manufacturing.

### FRESHMAN YEAR

(See page 66)

### SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Engl. 203 Intr. to Literature	3	Econ. 203 Prin. of Economics	3
Hist. 106 Hist. of United States	3	Govt. 206 American National Govt.	3
Math. 307 Calculus	3	M.E. 222 Materials Science	2
M.E. 212 Engr. Mechanics	3	M.E. 310 Mach. Prod. Techniques	1
M.E. 309 Mach. Prod. Techniques	1	M.E. 313 Engr. Mechanics	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	18		17

### JUNIOR YEAR

C.E. 305 Mechanics of Materials	3	E.E. 331 Theory & Appl. of Elect. Devices	4
E.E. 307 Electrical Circuits	4	Engl. 210 Argumentation	3
Math. 308 Differential Equations	3	M.E. 328 Thermodynamics	3
M.E. 327 Thermodynamics	3	M.E. 338 Kinem. & Mach. Design	3
M.E. 340 Phys. Metallurgy	3	M.E. 344 Fluid Mechanics	3
	16	M.E. 403 Engr. Laboratory	2
			18

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
I.En. 401 Survey of Ind. Engr.	3	E.E. 308 Elect. Machinery	3
M.E. 404 Engr. Laboratory	2	M.E. 417 Power Engr.	3
M.E. 445 Machine Design	3	M.E. 446 Machine Design	3
M.E. 459 Mech. Vibration	3	M.E. 481 Seminar	1
M.E. 461 Heat Transfer	3	Technical Elective	3
Technical Elective	3	Elective (Humanities or Social Science)	3
	17		16

NOTE: Technical electives in mechanical engineering are to be selected from the following courses: I.En. 458; Math. 417; M.E. 409, 410, 414, 432, 436, 457, 485; N.E. 401.

### Curricula in PETROLEUM ENGINEERING

The curricula in petroleum engineering are intended to prepare students for the petroleum industry and particularly for those branches which have to do with drilling, production, and transportation of petroleum as well as with the natural gas industry.

Two programs in petroleum engineering are available to the students in this department, a regular four-year curriculum in petroleum engineering leading to the degree of Bachelor of Science and a five-year curriculum in Petroleum Engineering leading to the degree of Bachelor of Petroleum Engineering.

In addition to these specific degree programs, five year combination degree curricula may be arranged, such as petroleum engineering—chemical engineering, petroleum engineering—geological engineering, petroleum engineering—mechanical engineering, or petroleum engineering—English for one desiring a broader educational background. Those desiring the five-year combination degree curricula in petroleum engineering and another field should contact the Head of the Petroleum Engineering Department for assistance in planning the course of study.

#### Four-Year Curriculum

(A minimum of six weeks of approved experience in oil field operations or Pet. E. 300 required for registration in senior Petroleum Engineering courses.)

The four-year curriculum in petroleum engineering includes sufficient training in civil, mechanical, and electrical engineering to prepare the graduate for the application of engineering principles to the petroleum industry. Courses in geology give an understanding of the geological structures and conditions favorable for petroleum deposits. To the basic subjects are added courses in petroleum engineering which illustrate the application of engineering principles to the type of problems met in the petroleum industry and which also give some understanding of the technique of the industry. Emphasis is placed on thorough grounding in the fundamentals rather than on application to particular problems.

#### FRESHMAN YEAR

(See page 66)

#### SOPHOMORE YEAR

Geol. 201 General Geology	3	Chem. 316 Quant. Analysis	2
Geol. 207 Mineral & Rock Study	4	Chem. 318 Quant. Anal. Lab.	2
Math. 307 Calculus	3	Geol. 210 Historical Geology	4
M.E. 212 Engr. Mechanics	3	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	M.E. 313 Engr. Mechanics	3
Phys. 219 Sound, Light, Electricity	4	M.S. or A.S.	1
P.E. 201	R	Phys. 220 Modern Physics	4
	18	P.E. 202	R
			18

#### JUNIOR YEAR

Chem. 323 Physical Chemistry	3	E.E. 305 Elect. Circuits & Machinery	4
Chem. 325 Phys. Chem. Lab.	1	Math. 308 Differential Equations	3
C.E. 305 Mechanics of Materials	3	M.E. 346 Fluid Mech. & Heat Trans.	3
Geol. 312 Structural Geology	3	Pet.E. 306 Reservoir Rock Prop.	2
M.E. 323 Thermodynamics	4	Pet.E. 308 Rock & Fluid Prop. Lab.	1
Pet.E. 305 Petroleum Develop.	2	Pet.E. 310 Reservoir Fluids	3
Pet.E. 307 Petroleum Dev. Lab.	1	Pet.E. 312 Well Logging	1
	17		17



## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Pet.E. 405 Drilling & Prod. Design	3	Govt. 206 American National Govt.	3
Pet.E. 409 Subsurface Engr.	2	Pet.E. 402 Pet. Property Mgmt.	3
Pet.E. 413 Pet. Meas. & Transportation	3	Pet.E. 414 Pet. Prod. Engr.	2
Pet.E. 415 Measurements Lab.	1	Pet.E. 438 Reservoir Engr.	2
Pet.E. 428 Reservoir Engr.	2	Elective (Humanities or Social Science)	7
Elective (Humanities or Social Science)	3		
Elective	3		17
	17		

## Five-Year Curriculum

(A minimum of six weeks of approved experience in oil field operations or Pet. E. 300 required for registration in senior Petroleum Engineering courses.)

The five-year curriculum in petroleum engineering is designed to provide a broader educational background. This curriculum contains all the courses included in the four-year curriculum and courses in psychology, accounting, English, economics, business, geography, and advanced mathematics.

## FRESHMAN YEAR

(See page 66)

## SOPHOMORE YEAR

Geol. 201 General Geology	3	Chem. 316 Quant. Analysis	2
Geol. 207 Mineral. & Rock Study	4	Chem. 318 Quant. Anal. Lab.	1
Math. 307 Calculus	3	Geol. 210 Historical Geology	4
M.E. 212 Engr. Mechanics	3	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	M.E. 313 Engr. Mechanics	3
Phys. 219 Sound, Light, Electricity	4	M.S. or A.S.	1
P.E. 201	R	Phys. 220 Modern Physics	4
	18	P.E. 202	R
			18

## JUNIOR YEAR

Chem. 323 Physical Chemistry	3	Chem. 324 Physical Chem.	3
Chem. 325 Phys. Chem. Lab.	1	Chem. 326 Phys. Chem. Lab.	1
C.E. 305 Mechanics of Materials	3	Engl. 210 Argumentation	3
C.E. 315 Strength of Mat. Lab.	1	Geol. 312 Structural Geology	3
Engl. 203 Intr. to Literature	3	Math. 417 Numerical Analysis	4
Math. 308 Differential Equations	3	M.E. 346 Fluid Mech. & Heat Transfer	3
M.E. 323 Thermodynamics	4	Spch. 403 Public Speaking	3
	18		20

## SENIOR YEAR

Econ. 203 Prin. of Economics	3	Acct. 409 Survey of Accounting Prin.	3
E.E. 307 Elect. Circuits	4	E.E. 308 Elect. Machinery	3
Engl. 301 Writing for Professional Men	3	Pet.E. 306 Reservoir Rock Properties	2
Mgmt. 211 Business Law	3	Pet.E. 308 Rock & Fluid Prop. Lab.	2
Pet.E. 305 Petroleum Development	2	Pet.E. 310 Reservoir Fluids	3
Pet.E. 307 Pet. Develop. Lab.	1	Pet.E. 312 Well Logging	1
	16	Elective (Humanities or Social Science)	4
			17

## FIFTH YEAR

Geog. 401 International Polit. Geog.	3	Govt. 206 American National Govt.	3
Pet.E. 405 Drilling & Prod. Design	3	Pet.E. 402 Pet. Prop. Mgmt.	3
Pet.E. 409 Subsurface Engr.	2	Pet.E. 414 Pet. Prop. Engr.	2
Pet.E. 413 Pet. Meas. & Transportation	3	Pet.E. 438 Reservoir Engr.	2
Pet.E. 415 Measurements Lab.	1	Psy. 303 Psy. for Tech. Students	3
Pet.E. 428 Reservoir Engr.	2	Technical Elective*	1
Elective (Humanities or Social Science)	3	Elective (Humanities or Social Science)	1
	17		17

\*To be chosen from Pet.E. 416, 419, or 481.

### Electives in ENGINEERING

Students with the proper prerequisites may choose their general electives from the list below. Other courses are available to the student upon recommendation of department heads and the approval of the Dean of Engineering. With the approval of the department head and the Dean of Engineering, certain courses in the social sciences and in the physical sciences may be used for technical electives.

#### I. Humanities

1. Arch. 339, 340, 439, 440; Engl. 212, 231, 232, 315, 316, 321, 322, 327, 328, 334, 336, 340, 350, 371, 375.
2. Modern Languages: Any course offered by the Department.
3. Philosophy: Any course offered by the Department.

#### II. Social Science

1. Geog. 204, 401; Psy. 207, 301, 303, 305, 401, 403; Soc. 205, 206, 314, 315, 320, 411, 412, 418.
2. Economics: Any course offered by the Department.
3. History and Government: Any sophomore, junior, or senior course offered by the Department.

#### III. Others

1. C.E. 348, 406, 408, 435, 457, 473; E.E. 331, 457; E.G. 221; Engl. 301, 410; Geol. 201 or 205; H.E. 216; I.Ed. 328, 429; I.En. 401, 412, 414, 458; Jour. 304, 311, 315, 321, 406; Ocn. 401; P.E. 210, 221.
2. Air Science: Any junior or senior course offered by the Department.
3. Biology: Any course, but not more than 7 hours of freshman courses.
4. Business Administration: Any sophomore, junior, or senior courses offered by the School.
5. Chemistry: Any sophomore, junior, or senior course offered by the Department.
6. Mathematics: Any junior or senior course offered by the Department.
7. Military Science: Any junior or senior course offered by the Department.
8. Nuclear Engineering: Any course offered by the Department.
9. Physics: Any junior or senior course offered by the Department.

# The College of Geosciences

## ADMINISTRATIVE OFFICERS

H. R. Byers, A.B., S.M., Sc.D. .... Dean  
E. B. Doran, Jr., B.A., M.S., Ph.D. .... Assistant Dean

## GENERAL STATEMENT

In the solid earth, its surface waters, oceans and atmosphere are found the prototypes of materials and processes that shape the universe. Man's existence is tied to the earth and the solar system; yet he has much to learn about the constitution and processes of his seemingly familiar surroundings.

The several departments in the College of Geosciences have a common interest in the infinite variety of problems which characterize the earth environment and Man's adaptation to it. Although a certain amount of laboratory work is performed, most of the study must be concerned with uncontrolled natural processes in which the complexity of multiple interacting forces adds to the difficulty but at the same time to the pleasure of discovering the true facts. It is no exaggeration to state that we are in the midst of a scientific revolution as far as our knowledge of the earth is concerned, a revolution whose excitement has attracted many of the country's best minds to the study of the geosciences.

The College of Geosciences is participating in the teaching and research which are associated with these interesting developments. The curricula which follow indicate the areas in which students may elect to concentrate their studies in this vast and rapidly advancing field.

## CURRICULA

Geology	Oceanography
Geophysics	Biological
Meteorology	Chemical
	Geological
	Physical
	Meteorological

## THE HONORS PROGRAM

The College of Geosciences participates in the Honors Program, which is described in detail on page 89.

## Curriculum in GEOLOGY

Training in geology is designed to prepare the student in the fundamentals of the earth sciences. These include the study of rocks, minerals, fossils, earth structures, the physical features of the earth's surface, and the economic application of this knowledge.

This curriculum is designed for the student who approaches geology as a science, with the inherent obligation of exploring, observing, analyzing, inquiring, classifying, describing, and finally interpreting the record and the content of the rocks. It is based upon the related sciences of chemistry, physics, mathematics, and biology. It prepares a man either for general geological investigations or for graduate study in geology in a normal period of four years.

## FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
E.G. 105 Engr. Graphics	2	E.G. 106 Descriptive Geometry	2
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	Hist. 105 Hist. of United States	3
Math. 103 Plane Trigonometry	3	Math. 121 Analytic Geom. & Calculus	4
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	16		17



## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Chem. 226 Chem. Calculations	2	Chem. 316 Quantitative Analysis	2
Geol. 201 General Geology	3	Chem. 318 Quant. Anal. Lab.	1
Geol. 203 Crystall. & Mineralogy	4	Geol. 204 Min. & Rock Study	2
Geol. 209 Intr. to Field Work	1	Geol. 210 Historical Geology	4
Math. 122 Calculus	4	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 213 Mechanics & Heat	4	Phys. 219 Sound, Light, Electricity	4
P.E. 201	R	P.E. 202	R
	<hr/> 19		<hr/> 17

## JUNIOR YEAR

Econ. 203 Prin. of Economics	3	C.E. 208 Topographic Surveying	2
Geol. 303 Petrog. & Petrology	3	Engl. 231 or 232 Survey of English Lit.	3
Geol. 305 Invertebrate Paleontology	3	Geol. 312 Structural Geology	3
Govt. 206 American National Govt.	4	Geol. 317 Stratigraphic Paleontology	1
Elective in Science or Mathematics <sup>1</sup>	3	Geology (elective) <sup>2</sup>	3
	<hr/> 16	Elective <sup>3</sup>	3
			<hr/> 15

## SUMMER CAMP

Geol. 300, Field Geology, credit 6

## SENIOR YEAR

Geol. 315 Prin. of Sedimentation	3	Geol. 427 Stratigraphy	3
Geol. 431 Seminar	1	Geol. 432 Seminar	1
Geology (elective) <sup>2</sup>	3	Geology (elective) <sup>2</sup>	3
Geop. 435 Prin. of Geophysical Explor.	4	Geophysics (elective) <sup>4</sup>	3
Elective <sup>3</sup>	6	Elective <sup>3</sup>	6
	<hr/> 17		<hr/> 16

- NOTES: 1. Elective in Science or Mathematics should be chosen from Chem. 323, 325; Math. 307; or Phys. 220 in consultation with, and on approval of, the Head of the Department.
2. Geology electives are to be selected in consultation with, and on approval of, the Head of the Department.
3. Electives are to be chosen from the humanities or social sciences, or from the fields of biology, chemistry, mathematics, or physics; or from junior and senior courses in engineering.
4. Geophysics elective may be either Geop. 436 or 446.

Curriculum in  
GEOPHYSICS

## FRESHMAN YEAR

(Same as for Engineering, page 66)

## SOPHOMORE YEAR

Chem. 226 Chem. Calculations	2	Chem. 316 Quantitative Analysis	2
Geol. 201 General Geology	3	Chem. 318 Quant. Anal. Lab.	1
Geol. 203 Crystall. & Mineralogy	4	Geol. 204 Min. & Rock Study	2
Geol. 209 Intr. to Field Work	1	Geol. 210 Historical Geology	4
Math. 307 Calculus	3	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	<hr/> 18		<hr/> 17

## JUNIOR YEAR

Econ. 203 Prin. of Economics	3	E.E. 331 Theory & Appl. of Elect. Dev.	4
E.E. 307 Elect. Circuits	4	Geol. 312 Structural Geology	3
Engl. 210 Argumentation	3	Govt. 206 American National Govt.	3
Math. 303 Differential Equations	3	Math. 405 Vector Analysis	3
Technical Elective	3	Phys. 302 Phys. Mechanics	3
	<hr/> 16		<hr/> 16

## SUMMER CAMP

Geol. 300, Field Geology, credit 6

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Chem. 323 Physical Chemistry	3	Geol. 482 Seminar	1
Chem. 325 Phys. Chem. Lab.	1	Geop. 436 Seismic Exploration	3
Geol. 481 Seminar	1	Geop. 446 Physics of the Earth	3
Geop. 435 Prin. of Geophys. Explor.	4	Technical Elective	3
Phys. 408 Thermo. & Stat. Mechanics	3	Elective (Humanities or Social Science) <sup>1</sup>	6
Elective (Humanities or Social Science) <sup>1</sup>	3		16
	15		

NOTES: 1. French, German, or Russian is recommended (two semesters of same language).

2. By choice of technical electives, a student may gain proficiency in different fields, such as advanced physics, geology, mathematics, or programming of digital computers. Electives may be selected from the following courses: E.E. 308; Geol. 315, 404, 406, 425, 427; I.En. 458; Math. 409, 410, 414, 417; Phys. 311, 405, 416.

Curriculum in  
METEOROLOGY

Meteorology is the science of planetary atmospheres and their phenomena. Within the broad field of geophysics, it is concerned with physical and chemical processes and states within the earth's atmosphere and at the earth's surface. The objective of terrestrial meteorology is to determine the natural and physicochemical controls of the atmosphere and to apply this knowledge in various ways benefiting life and human endeavor.

Weather and climate through the ages have shaped the physical and biological features of the earth and have guided the course of human activities. However, it is only through quite recent, and continuing, developments in technology, communications, and transportation that sufficient information has been obtained about the atmosphere to enable meteorology to emerge as a separate college or university study. While satisfying public interest in the weather has been the major objective in meteorology, the last few years have witnessed rapidly expanding applications in agriculture, engineering, industry, business, commerce, space exploration and travel, and national defense.

## FRESHMAN YEAR

Biol. 115 Survey of Biology	4	Chem. 102 Gen. Chemistry	4
Chem. 101 Gen. Chemistry	4	Engl. 104 Composition & Rhetoric	3
Engl. 103 Composition & Rhetoric	3	Math. 122 Calculus	4
Math. 121 Analytic Geom. & Calculus	4	M.S. or A.S.	1
M.S. or A.S.	1	Phys. 218 Mechanics & Heat	4
P.E. 101	R	P.E. 102	R
	16		16

## SOPHOMORE YEAR

Engl. 212 Shakespeare	3	Hist. 106 Hist. of United States	3
Hist. 105 Hist. of United States	3	Math. 303 Differential Equations	3
Math. 307 Calculus	3	Met. 305 Gen. Meteorology	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language	3	Modern Language	3
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	17		17

## JUNIOR YEAR

Econ. 203 Prin. of Economics	3	Met. 324 Phys. & Reg. Climatology	3
Govt. 206 American National Govt.	3	Met. 336 Atmospheric Motions	3
Met. 315 Met. Instrum. & Observ.	4	Met. 451 Fund. of Meteorol. Anal.	4
Met. 335 Atmos. Statics & Thermo.	2	Ocn. 401 Intr. to Oceanography	3
Phil. 301 Intr. to Philosophy	3	Sph. 403 Public Speaking	3
Elective	3	Elective	3
	18		19

## SENIOR YEAR

First Semester		Credit	Second Semester		Credit
Engl. 301	Writing for Professional Men	3	Met. 425	Meth. in Climatology	4
Geop. 446	Physics of Earth	3	Met. 446	Phys. Meteorology	3
Met. 445	Atmos. Phys. Processes	3	Meteorology (elective)		3
Met. 452	Weather Anal. & Prognosis	3	Technical Elective		4
Elective (Meteorological or Tech.)		3	Elective		3
Elective		3			17
		18			

- NOTES: 1. Electives shall be chosen and approved according to the following policy: Not more than 12 elective hours of advanced courses in meteorology will be permitted toward requirements for graduation.
2. Technical electives are to be chosen from the following courses: Geog. 203; I.En. 458; Math. 405, 414, 417; N.E. 401; Phys. 302, 314, 317, 405, 420.
3. Electives in Meteorology are to be chosen from the following courses: Met. 435, 453, 467, 475, 479, 481, 485.

## OCEANOGRAPHY

Oceanography is the study of the oceans and their boundaries. It is based upon the unity of the sciences of the sea. Effective study of the subject requires thorough previous training in one of the pertinent basic sciences such as biology, chemistry, geology, mathematics, meteorology, and physics, or in engineering. Therefore, much of the work in oceanography is conducted at the graduate level, and the undergraduate program of students who wish to study oceanography must be planned to satisfy certain prerequisite requirements. It is suggested that such students consult regularly during their undergraduate years with the oceanography staff.

Five options, the biological, chemical, geological, physical and meteorological with their corresponding engineering phases, are offered. The options require different undergraduate programs. These programs are taken in other departments.

In the graduate program there are curricula leading to the Master of Science and Doctor of Philosophy degrees in each of the five options in oceanography. Specific prerequisite requirements are set up for each curriculum. In general, these consist of the courses normally required for the degree of Bachelor of Science in one of the basic fields listed above and some course work in each of the other fields.

Oceanography may be utilized in solving certain problems arising in fisheries work, offshore oil and gas operations, navigation, prevention of beach erosion, certain aspects of weather forecasting, extraction of raw materials from the sea, marine construction, coastal sanitation, military operations, fresh water supply, and many other activities. It requires broad interests, numerous skills, a real liking for the sea, and an adaptability to shipboard life.



# *The College of Liberal Arts*

## ADMINISTRATIVE OFFICERS

F. W. R. Hubert, B.A., M.A., Ph.D. ....	Dean
L. J. Martin, B.S., M.A., Ph.D. ....	Associate Dean
D. F. Simons, B.B.A., M.B.A. ....	Assistant to the Dean

## GENERAL STATEMENT

The College of Liberal Arts offers curricula leading to undergraduate and graduate degrees. Its primary purpose in the University is to offer the breadth of education necessary to the development of the educated man. The College believes it can accomplish its purpose if it requires a proficiency in the use of English, a study of significant broad fields of human knowledge, and the acquisition of a thorough command of one specific subject of knowledge. The Faculty of the College believes that in achieving this purpose it will produce an educated man who possesses an awareness, understanding and appreciation of the intellectual achievements of mankind; an awakened intellectual interest in the nature of the world; a curiosity about a specific body of knowledge that he may cultivate in adult life; a disciplined and intellectual approach to the problems of society; and a preparation, broadly conceived, for the career he will follow, whether he enters upon it directly after graduation or pursues further training on the graduate or professional level.

Generally, the student enrolled in the College of Liberal Arts studies introductory work in fundamental subjects for his first two years to enable him to attain experience and breadth of view so that he may take a more intelligent part in his own further education. During the last two years the student selects a major field of study and appropriate electives.

For those students who seek professional career training, the College offers three programs—training for a career in business through four departments of the School of Business Administration, for a career in teaching through the Department of Education and Psychology, and for a career in journalism through the Department of Journalism. Students who follow one of these programs will be prepared to enter upon their careers directly on graduation with a Bachelor's degree or to pursue further study on the graduate level.

The College also offers a special Honors Program and programs in Latin American Studies, Liberal Arts, and Pre-Law.

## Organization for Instruction

The College of Liberal Arts, offers instruction in the following departments:

Economics	History and Government
Education and Psychology	Journalism
English	Modern Languages
Health and Physical Education	Philosophy and Humanities

The School of Business Administration is administratively associated with the College of Liberal Arts. Departments in the School are the following:

Accounting	Management
Business Analysis	Marketing
Finance	

## Degrees Offered

The College of Liberal Arts offers three undergraduate degrees—Bachelor of Arts, Bachelor of Science, and Bachelor of Business Administration.

A student proceeds to the Bachelor of Arts degree when his field of major study is Economics, Education, English, Government, History, Journalism, or Modern Languages.

Programs leading to the Bachelor of Science degree are Education, Health and Physical Education, and Psychology.

Programs leading to the Bachelor of Business Administration, in the School of Business Administration, are Accounting, Finance, Management, and Marketing.

The College of Liberal Arts also offers five graduate degrees: (1) Master of Arts, with majors in English, Government, or History, (2) Master of Science, with majors in Economics and Education, (3) Master of Business Administration with Professional Fields in Accounting, Organization and Administration, Computer Science, and Statistics, (4) Master of Education, (5) Doctor of Philosophy, with a major in Education. The catalogue of the Graduate College provides an extensive description of the graduate program in Liberal Arts at Texas A&M University.

### Combined Degree Plan

Students may also pursue a five year program, combining professional training with a broad general education to qualify for two degrees. Students who are interested in this program should (1) maintain a grade point ratio above the normal minimum requirements; and (2) consult with the appropriate department heads and deans prior to formulating a combined degree plan. The first step in formulating a combined degree plan is consultation with the dean of the college in which the student is enrolled.

Candidates for a second Bachelor's degree must have been in residence at least two academic years and must complete all the essential work of the second curriculum not covered in the first. In all such cases, the total amount required must be at least 30 semester hours additional to the greater number required for either degree.

### Majors, Minors, and Electives

1. **Major concentration courses.** When a student is enrolled in the College of Liberal Arts, he may indicate a department of special interest in which he will pursue his major studies. The student must choose one of the following curricula as the field of major study:

#### For the B.A. degree

Economics  
Education  
English  
Government

History  
Journalism  
Modern Languages

#### For the B.S. degree

Education  
Physical Education

Psychology

#### For the B.B.A. degree

Accounting  
Finance

Management  
Marketing

#### Pre-Law\*

2. **Minor Concentration of Study.** In addition to selecting a major, the student seeking a B.A degree also chooses a minor field of study to reinforce his major. For the minor, he may select one of the above curricula, other than that of his major study, or one of the following: biology, chemistry, entomology, geography, geology, meteorology, philosophy, physics, or sociology. The student working toward the B.B.A. or B.S. degree does not select a minor field of study unless he is seeking a B.S. degree in Psychology.

3. **Electives.** Students select a variety of courses in any of the areas of study indicated above, or in other departments of the University, subject to the approval of the Dean of the College of Liberal Arts, or, for B.B.A. students, the Director of the School of Business Administration. It is recommended that most of the elective courses be in fields other than the major, and that the student take at least one course outside his major field during each semester of his junior and senior years. A student will normally be expected to take electives in accordance with his academic classification.

### Selected Studies in Liberal Arts for Undecided Students

A student sometimes enrolls at Texas A&M University without having identified a field of major interest or without having chosen a vocation toward which he will

\*The Pre-Law major is described as a "Special Program" in the College of Liberal Arts on page 89 of this catalogue.

work. The Selected Studies Program in the College of Liberal Arts is expressly designed for that student. It offers a curriculum for the student's freshman year in which the student is introduced to a number of fields while he still fulfills basic freshman requirements. The keynote of the Selected Studies Program is exploration. It enables the student to make important academic choices for sound reasons, counseled by the Dean of the College of Liberal Arts. Prior to his sophomore year, however, a student must identify his major field.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
Science <sup>2</sup>	3 or 4	Science <sup>2</sup>	3 or 4
Elective <sup>3</sup>	3 or 4	Elective <sup>3</sup>	3 or 4
P.E. 101	R	P.E. 102	R
	<hr/> 16 or 18		<hr/> 16 or 18

- NOTES: 1. Based upon an analysis of his high school record and entrance tests, a student may be required to register for either a reduced load or for special courses.
2. The selection of a science course will be made in consultation with an advisor, depending upon the area of interest indicated by the student.
3. These elective hours are available to the student to explore any specialized area of interest to assist him in the selection of a course of study.

### General Requirements of the College of Liberal Arts

1. To fulfill the requirements for graduation, a student must satisfactorily complete not less than 137 semester hours of approved courses.
2. A student must complete not less than thirty semester hours in his major study, of which at least twelve hours are in advanced courses (above the sophomore level), and not less than eighteen semester hours in his minor study, of which at least six hours are in advanced courses. Upon recommendation of the head of the student's major department, the Dean may authorize the substitution of courses in closely related departments for a limited number of hours in the major or minor study.
3. The student will satisfy the foreign language requirement, when it is specified in his curriculum, by completing four semesters of study in one language.
4. A student whose curriculum includes a sophomore science requirement may satisfy this requirement in one of three ways:
  - a. Normally, he will schedule any two (one each semester) of the following survey courses: Chem. 106, Geog. 203, Phys. 211.
  - b. Alternatively, he may substitute for the two survey courses any two-semester course in chemistry or physics.
  - c. By special permission of the Dean, he may be allowed to substitute the first semester of the usual two-semester introductory course in chemistry, geology, or physics for the survey course in that science. This last provision is intended to prevent unnecessary duplication in the program of students changing from one curriculum to another or transferring from another institution with science credit equivalent to an introductory rather than a survey course.
5. A student must demonstrate his ability to express himself in acceptable English by passing a written examination in English composition. This examination must be taken not later than the spring semester of the junior year. Each student who fails to make a passing grade will be required to report to the Department of English for assignment of remedial work, which the student must complete satisfactorily without degree credit. Only if the Department of English has certified satisfactory completion of such remedial work and if the student has passed his examination will the student be granted regular status as a degree candidate.

6. In the College of Liberal Arts, the following courses are required in all curricula: Engl. 103, 104; Hist. 105, 106; Math. 102; Econ. 203; Govt. 206; P.E. 101, 102, 201, 202 (for students under 21 years).

Other requirements are listed within each department's curriculum.



## SPECIAL PROGRAMS

## 1. THE HONORS PROGRAM

## The Purpose of Honors

The College of Liberal Arts, the College of Science, and the College of Geosciences jointly sponsor an Honors Program to offer the superior student special opportunities for academic work of a range and depth appropriate to his capabilities and greater intellectual interests.

## Admission to the Program

Students are admitted to the Honors Program by invitation only, but inquiries from students are welcomed. A student can gain admission to the program at any point in his college career upon demonstration of his ability to do superior work. Inquiries concerning the program should be addressed to the Chairman of the Honors Committee, College of Liberal Arts, Texas A&M University, College Station, Texas.

## General Nature of Work in Honors Sections

In general, honors sections are smaller than regular sections, and students participate more actively in class discussion. In honors sections, broader and more complex aspects of the subject are covered, and students have more opportunity for independent work. Grades assigned for work in honors sections are the same as the quality of work would merit if done in regular sections.

## Honors Colloquia for Freshmen

Honors colloquia provide the freshman student an opportunity to meet outstanding members of the faculty and to discuss ideas in an informal atmosphere. Discussions are based upon lectures or cultural events. Both visiting lecturers and lecturers from Texas A&M University will participate in colloquia. Colloquia in the freshman year present an introduction to the significant disciplines of human knowledge.

## 2. LATIN AMERICAN STUDIES

A number of departments offer courses relating to Latin America, so that it is possible for many students (including some who are registered in the other colleges of the University) to combine some concentration in Latin American studies with their regular department major. The program of offerings on Latin America is designed to meet the needs of four classes of students: (1) those who expect to enter into business in Latin America or into trade with Latin America; (2) those who contemplate a career in the foreign service of the United States Government or in those government agencies in Washington which employ specialists on Latin America, with assignments both in the United States and abroad; (3) those who expect to enter into teaching or research with emphasis upon Latin America; and (4) those who wish to broaden their education and acquire a better understanding of the people and the problems of Latin America. Any student who elects to coordinate some study of Latin America with a regular major in one of the University departments should consult the head of his major department for guidance in working out his program of study. Inquiries about the program in Latin American studies should be directed to the Dean of Liberal Arts.

Those courses which bear directly on Latin America include the following:

Geog. 201	World Regional Geography	Hist. 422	Internal Rival. in Gulf-Carib. Area
Geog. 303	Geog. of South America	M.L. 305	Modern Span.-Amer. Drama
Govt. 335	Govt. & Politics of Latin America	M.L. 306	Modern Span.-Amer. Drama
Hist. 341	South America to 1825	M.L. 325	Pub. Spkg. in Spanish
Hist. 342	South America Since Independence	M.L. 326	Pub. Spkg. in Spanish
Hist. 413	Mexico & Span. N.A., 1492-1821	M.L. 335	Spanish-American Novel
Hist. 414	Hist. of Mexico, 1821 to Present	M.L. 336	Spanish-American Novel
		Soc. 414	Social Institutions of Latin America

## 3. PRE-LAW

An increasing number of students planning to study law complete a baccalaureate degree before entering a law school, and some law schools require this degree as a condition of admission. For example, all applicants for admission to The University of Texas School of Law are required to have a baccalaureate degree from an accredited college or university, as well as an acceptable score on the Law School Admission Test.

Students who plan to obtain an undergraduate degree before undertaking the study of law will normally register for one of the regular degree programs, and will find it

advisable to include among their elective hours Acct. 227, Govt. 308, and Hist. 213 and 214. Particularly appropriate are the programs in business administration, economics, English, and history. Students who plan to complete no more than three years of undergraduate work before entering law school will matriculate in the three-year preparatory program listed below. Any student who completes this program may still earn a Bachelor of Arts degree with a major in history and a minor in economics by completing one additional year of course work as follows: (Econ. 321, 324; 12 semester hours of history selected from Hist. 302, 315, 318 (or 423 and 424), 331, 411, and 421; Spch. 403; and 16 hours of electives, including, if possible, B.Ana. 303. Inquiries about the Pre-Law Program should be directed to the Head of the Department of History and Government.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 Gen. Botany of Seed Plants	3	Biol. 107 Vertebrate Zoology	3
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
Mod.Lang. <sup>1</sup> (Fr., Germ., or Span.)	3	Mod.Lang. <sup>1</sup> (Fr., Germ., or Span.)	3
P.E. 101	R	Elective	1
	16	P.E. 102	R
			17

### SOPHOMORE YEAR

Acct. 227 Prin. of Accounting	4	Acct. 228 Prin. of Accounting	4
Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 212 Shakespeare	3	Engl. 231 or 232 Survey of Engl. Lit.	3
M.S. or A.S.	1	M.S. or A.S.	1
Mod. Lang. <sup>1</sup> (Fr., Germ., or Span.)	3	Mod. Lang. <sup>1</sup> (Fr., Germ., or Span.)	3
Science <sup>2</sup>	4	Science <sup>2</sup>	4
P.E. 201	R	P.E. 202	R
	18		18

### JUNIOR YEAR

Econ. 311 Money & Banking	3	Econ. 412 Public Finance	3
Govt. 206 American National Govt.	3	Govt. 207 State & Local Govt.	3
Hist. 213 Hist. of England	3	Govt. 308 U. S. Constitutional Dev.	3
Phil. 301 Intr. to Philosophy	3	Hist. 214 Hist. of England	3
Psy. 207 Gen. Psychology	3	Phil. 381 Ethical Theory	3
Elective	3	Elective	3
	18		18

- NOTES: 1. See. No. 3, **General Requirements of the College of Liberal Arts**, page 88.
2. To satisfy the requirement in physical science, the student may choose one of the following: Chem. 101, 102 or Phys. 201, 202.
3. The American Bar Association minimum requirement for admission to an accredited law school is three years of acceptable college work. Students who plan to seek admission to a law school after completing the three-year program listed above are strongly advised to check the program with the registrar of the school of their choice before beginning the third year. If necessary to meet specific requirements, substitutions may be approved by the Dean of the College of Liberal Arts.
- Students planning to attend the Law School of the University of Texas must use the 6 semester hours of elective in the junior year for advanced courses (300-400 level) in economics, government, history, or sociology.
4. A student may qualify for the Bachelor of Arts degree from the Texas A&M University by completing the three-year pre-law curriculum here and at least one year at an accredited law school, with a minimum of 137 acceptable semester hours, subject to the usual grade point requirement.

### Curriculum in ECONOMICS

Most students who major in economics enter upon a business career following their graduation. These students obtain a broad foundation for such a career by combining a judicious selection of courses in business administration with those prescribed in their major program. Other students find it desirable to obtain an undergraduate degree with a major in economics before entering law school. Still others pursue the four-

year course in preparation for graduate study leading to careers in teaching, research, or government service.

FRESHMAN YEAR<sup>1</sup>

First Semester		Credit	Second Semester		Credit
Biol. 101 <sup>2</sup>	Gen. Botany of Seed Plants	3	Biol 107 <sup>2</sup>	Vertebrate Zoology	3
Engl. 103	Composition & Rhetoric	3	Engl. 104	Composition & Rhetoric	3
Hist. 105	Hist. of United States	3	Hist. 106	Hist. of United States	3
Math. 102	Algebra	3	Math. 103	Plane Trigonometry	3
M.S. or A.S.		1	M.S. or A.S.		1
Modern Language <sup>3</sup>		3	Modern Language <sup>3</sup>		3
P.E. 101		R	Elective		2
		—	P.E. 102		R
		16			18

## SOPHOMORE YEAR

Acct. 227	Prin. of Accounting	4	Acct. 228	Prin. of Accounting	4
Econ. 203	Prin. of Economics	3	Econ. 204	Prin. of Economics	3
Engl. 212	Shakespeare	3	Engl. 231 or 232	Survey of Engl. Lit.	3
M.S. or A.S.		1	M.S. or A.S.		1
Modern Language <sup>3</sup>		3	Modern Language <sup>3</sup>		3
Science <sup>4</sup>		4	Science <sup>4</sup>		4
P.E. 201		R	P.E. 202		R
		—			—
		18			18

## JUNIOR YEAR

B.Ana. 303	Statistical Method	4	Econ. 311	Money & Banking	3
Econ. 323	Economic Analysis	3	Econ. 320	Econ. Develop. of Europe	3
Psy. 207	Gen. Psychology	3	Economics (elective)		3
Or			Govt. 206	American National Govt.	3
Psy. 303	Psy. for Technical Students	3	Elective <sup>5-6</sup>		5
Elective <sup>5-6</sup>		7			—
		17			17

## SENIOR YEAR

Econ. 410	Theory of Income & Employment	3	Economics (elective)		6
Economics (elective)		6	Spch. 403	Public Speaking	3
Elective		8	Elective		7
		—			—
		17			16

- NOTES: 1. The student planning his advanced course of study should consult promptly with the Head of the Department and prepare his degree plan.
2. Transfers who have credit for any 6 hours of college biology may substitute such credit for Biol. 101, 107.
3. See "General Requirements of the College of Liberal Arts," No. 3, page 88.
4. See "General Requirements of the College of Liberal Arts," No. 4, page 88.
5. B.Ana. 304 or Fin. 341 can substitute for three semester hours of economics electives.
6. Junior and senior electives are to be selected after consultation with the student's major advisor.

Curriculum in  
ENGLISH

The curriculum in English is designed for breadth in education. In the Department of English, the English major studies writing skills, the language, and literature. Outside of the Department of English, he studies physical and biological sciences, social sciences, foreign languages, history, and philosophy. A large part of the program, especially in the junior and senior years, is left to the choice of the student. Through electives the student may extend his knowledge in the humanities, sciences, social sciences, or even technological skills. The curriculum for the English major, then, is suitable not only for the student who expects to continue his studies of the humanities in graduate school but also for the student who expects to go into business or to become a student of law or medicine or religion.

The student desiring both a full professional training and a broad general education may in five years complete the requirements for two degrees—Bachelor of Arts in English and Bachelor of Science in any one of the professional fields. For specific



degree plans, which are made out for each individual entering this program, the student should consult the Dean of Liberal Arts and the dean of any other college in which he seeks a professional degree. (For degrees in English and in Engineering, see page 61.)

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol 101 <sup>1</sup> Gen. Botany of Seed Plants	3	Biol. 107 <sup>1</sup> Vertebrate Zoology	3
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>2</sup>	3	Modern Language <sup>2</sup>	3
P.E. 101	R	Elective	2
	16	P.E. 102	R
			18

### SOPHOMORE YEAR

Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 231 Survey of English Lit.	3	Engl. 212 Shakespeare	3
Hist. 213 Hist. of England	3	Hist. 214 Hist. of England	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>2</sup>	3	Modern Language <sup>2</sup>	3
Science <sup>3</sup>	4	Science <sup>3</sup>	4
P.E. 201	R	P.E. 202	R
	17		17

### JUNIOR YEAR

Engl. 321 19th Century Lit.	3	English (elective)	3
Engl. 409 Intr. to Linguistics	3	English 322 19th Century Lit.	3
Or		Elective	12
Engl. 410 Hist. of English Lang.	3		19
Govt. 206 American National Govt.	3		
Elective	3		
	17		

### SENIOR YEAR

English (elective)	3	English (elective)	3
Spch. 407 Oral Interpretation	3	Elective	14
Elective	11		17
	17		

- NOTES: 1. Transfers who have credit for any 6 hours of college biology may substitute such credit for Biol. 101, 107.
2. See "General Requirements of the College of Liberal Arts," No. 3, page 88.
3. "See "General Requirements of the College of Liberal Arts," No. 4, page 88.

### Curriculum in GOVERNMENT

Courses in government are concerned with human society and the relations and institutions involved in man's existence and well-being as a member of an organized community. The manner in which a given society is governed is an important aspect of its general culture. Many considerations (economic, historical, sociological, psychological, religious, philosophical, and other factors) influence the political processes. For this reason a politically organized community must of necessity be a dynamic institution of man.

In its broadest concept within the liberal arts program, the study of government seeks to understand the way in which the rules and institutions of society are formulated, executed, and established. The center of interest may, depending upon the individual, be considered alternatively as the study of power, of government, of the state, or of human relations in their political context with a focus upon the solution of present-day problems in government. The study of government seeks to prepare the student either for the role of an active participant or leader in government and administration, or for the equally significant role of an informed citizen. Also, the

program in instruction is designed to guide students in exploring and understanding political processes, and to lay a sound foundation for further study in government at the graduate level.

## FRESHMAN YEAR

First Semester		Credit	Second Semester		Credit
Biol. 101 <sup>1</sup>	Gen. Botany of Seed Plants	3	Biol 107 <sup>1</sup>	Vertebrate Zoology	3
Engl. 103	Composition & Rhetoric	3	Engl. 104	Composition & Rhetoric	3
Hist. 105 <sup>2</sup>	Hist. of United States	3	Hist. 106 <sup>2</sup>	Hist. of United States	3
Math. 102	Algebra	3	Math. 103	Plane Trigonometry	3
M.S. or A.S.		1	M.S. or A.S.		1
Modern Language <sup>3</sup>		3	Modern Language <sup>3</sup>		3
P.E. 101		R	Elective		2
		—	P.E. 102		R
		16			—
					18

## SOPHOMORE YEAR

Econ. 203	Prin. of Economics	3	Econ. 204	Prin. of Economics	3
Engl. 212	Shakespeare	3	Engl. 231 or 232	Survey of Engl. Lit.	3
Govt. 206	American National Govt.	3	Govt. 207	State & Local Govt.	3
M.S. or A.S.		1	M.S. or A.S.		1
Modern Language <sup>3</sup>		3	Modern Language <sup>3</sup>		3
Science <sup>4</sup>		4	Science <sup>4</sup>		4
P.E. 201		R	P.E. 202		R
		—			—
		17			17

## JUNIOR YEAR

Government <sup>5</sup> (elective)	6	Government <sup>5</sup> (elective)	6
Hist. 213 <sup>6</sup>	Hist. of England	Hist. 214 <sup>6</sup>	Hist. of England
Or		Or	
Hist. 217 <sup>6</sup>	Development of Europe	Hist. 213 <sup>6</sup>	Development of Europe
Elective <sup>8</sup>		Elective <sup>8</sup>	
	8		9
	—		—
	17		18

## SENIOR YEAR

Government <sup>5</sup> (elective)	9	Government <sup>5</sup> (elective)	6
Spch. 403	Public Speaking	Elective <sup>7</sup>	11
Elective <sup>7</sup>			—
	5		—
	—		—
	17		17

- NOTES: 1. Transfers who have credit for any 6 hours of college biology may substitute such credit for Biol. 101, 107.
2. Students in the Honors Program may substitute Hist. 205 and 206.
3. See "General Requirements of the College of Liberal Arts," No. 3, page 88.
4. See "General Requirements of the College of Liberal Arts," No. 4, page 88.
5. Of the 33 semester hours of Government courses required for the undergraduate degree in Government, at least 27 hours must be advanced and include at least one advanced course from each of four of the following five categories into which the department's work is divided: (a) Government, Politics, and Public Administration; (b) International Law, Relations, and Organizations; (c) Foreign and Comparative Government; (d) Political Theory; and (e) Public Law.
6. The student has the choice of taking either Hist. 213 and 214, or Hist. 217 (or 101) and 218 (or 102).
7. Depending upon the interest of the student and the objectives of his program of study, candidates for the Bachelor of Arts degree with a major in Government shall choose 24 semester hours of their electives from the following courses: Acct. 227, 228; Ag.Ec. 422; Biol. 325; B.Ana. 303; Econ. 311, 318, 320, 321, 324, 412; Educ. 421, 423, 444; Engl. 321, 322, 327, 328, 336, 371, 372; Geog. 203, 302, 303, 304, 320; Hist. 302, 315, 318 (or 423 and 424), 321 and 322, 331, 341 and 342, 410, 419; Jour. 406, 409, 465; advanced hours in any modern language, or at least 6 semester hours in a second modern language provided 12 semester hours are completed in one modern language; Phil. 381, 407; Psy. 207 or 302; Soc. 205, 320. Students who complete both the requirements for a teaching certificate and the senior ROTC program may substitute A.S. 401 and 402 or M.S. 421 and 422 for a like number of hours in the above enumerated electives; but A.S. 301 and 302, M.S. 321 and 322, and Educ. 425 must come from the remaining unrestricted elective hours.

The student should confine his minor to some field in the humanities or social sciences, or a related field. Any problem in developing the required number of hours for a minor should be discussed with the Head of the Department of History and Government.

## Curriculum in HISTORY

Through a major in history a student may provide the basis for a broad liberal education, and at the same time find a useful vocation or avocation. History majors find employment opportunities in public school teaching, museum and archives work, state and national park service, diplomatic and consular service, public relations and public information offices, and in writing, research, and bibliographical work.

Many students find it desirable to obtain an undergraduate degree with a major in history and a minor in some related field such as economics, English, government, modern languages, or sociology before entering law school, seminary training, regular military service, and certain careers in industry and government.

The program in history provides excellent preparation for the further study of history beyond the baccalaureate degree.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 <sup>1</sup> Gen. Botany of Seed Plants	3	Biol 107 <sup>1</sup> Vertebrate Zoology	3
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 <sup>2</sup> Hist. of United States	3	Hist. 106 <sup>2</sup> Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>3</sup>	3	Modern Language <sup>3</sup>	3
P.E. 101	R	Elective	2
	16	P.E. 102	R
			18

### SOPHOMORE YEAR

Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 212 Shakespeare	3	Engl. 231 or 232 Survey of Engl. Lit.	3
Hist. 217 <sup>2</sup> Development of Europe	3	Hist. 218 <sup>2</sup> Development of Europe	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>3</sup>	3	Modern Language <sup>3</sup>	3
Science <sup>4</sup>	4	Science <sup>4</sup>	4
P.E. 201	R	P.E. 202	R
	17		17

### JUNIOR YEAR

Govt. 206 American National Govt.	3	Govt. 207 State & Local Govt.	3
History (elective)	6	History (elective)	6
Elective <sup>5</sup>	8	Elective <sup>5</sup>	9
	17		18

### SENIOR YEAR

History (elective)	6	History (elective)	3
Spch. 403 Public Speaking	3	Elective <sup>5</sup>	14
Elective <sup>5</sup>	8		17
	17		

- NOTES: 1. Transfers who have credit for any 6 hours of college biology may substitute such credit for Biol. 101, 107.
2. Students in the Honors Program may substitute Hist. 101, 102, 205, and 206 for these respective courses.
3. See "General Requirements of the College of Liberal Arts," No. 3, page 88.
4. See "General Requirements of the College of Liberal Arts," No. 4, page 88.
5. Effective for classes entering in September 1963 and thereafter. Depending upon the interest of the student and the objectives of his program of study, candidates for the Bachelor of Arts degree with a major in History shall choose 30 semester hours of their electives from the following categories: Acct. 227, 228; Ag.Ec. 422; Biol. 325; B.Anal. 303; Econ. 311, 318, 320, 321, 324, 412; Educ. 421, 423, 444; Engl. 321, 322, 327, 328, 336, 371, 372, 375, 376, 426; Geog. 203, 302, 303, 304, 320; Govt. 308, 310, 315, 320, 321, 325, 331, 333, 335, 425, 436, 441; Jour. 406, 409, 465; advanced hours in any modern language or at least 6 semester hours in a second modern language provided 12 semester hours are completed in one modern language; Phil. 381, 407; Psy. 207 or 302; Soc. 205, 320.
- Students who complete both the requirements for a teaching certificate and the senior ROTC program may substitute A.S. 401 and 402, or M.S. 421 and 422 for a like number of hours in the above enumerated electives; but A.S. 301 and 302, and M.S. 321 and 322, and Educ. 425 must come from the remaining unrestricted elective hours.
- The student should confine his minor to some field in the Humanities or Social Sciences, or related field. Any problem in developing the required number of hours for a minor should be discussed with the Head of the Department of History and Government.



## Curriculum in JOURNALISM

Programs for students majoring in journalism are designed to prepare them for futures in the communications field. By the beginning of the junior year each student determines, with the advice of his departmental advisor, what special phase of journalism he wishes to emphasize in his own program—community newspapers, urban newspapers, news-editorial work, advertising, publication management, industrial writing and editing, or radio-TV Journalism.

A major in agricultural journalism is available for students interested primarily in the field of technical journalism serving agriculture.

Upon completion of the curriculum, most students enter either the news or advertising departments of newspapers or magazines with some working with radio-television and some with industrial publications.

Students may also pursue a five-year program combining full professional training with a broad education to qualify for two degrees—the Bachelor of Science degree in a technical field, such as industrial technology, or Bachelor of Business Administration in Management concurrently with the Bachelor of Arts in Journalism.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 115 Survey of Biology	4	Engl. 104 Composition & Rhetoric	3
Engl. 103 Composition & Rhetoric	3	Hist. 106 Hist. of United States	3
Hist. 105 Hist. of United States	3	Jour. 102 Communications Media & Prin.	2
Math. 102 Algebra	3	M.S. or A.S.	1
M.S. or A.S.	1	Modern Language <sup>1</sup>	3
Modern Language <sup>1</sup>	3	Science <sup>2</sup>	4
P.E. 101	R	P.E. 102	R
	17		16

### SOPHOMORE YEAR

Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 212 Shakespeare	3	Engl. 232 Survey of English Lit.	3
Jour. 201 News Writing	3	Jour. 202 Beginning News Reporting	3
Math. 110 Survey Course in Math.	3	Jour. 315 Photography	2
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>1</sup>	3	Modern Language <sup>1</sup>	3
Elective	2	Soc. 205 Prin. of Sociology	3
P.E. 201	R	P.E. 202	R
	18		18

### JUNIOR YEAR

Govt. 206 American National Govt.	3	English (elective) <sup>3</sup>	3
Journalism (elective)	6	Jour. 307 News Editing	3
Elective	8	Journalism (elective)	3
	17	Mgmt. 211 Business Law	3
		Or	
		Mktg. 321 Marketing	3
		Elective	4
			16

### SUMMER WORK

Jour. 300; Summer Practice, ten weeks, required.

### SENIOR YEAR

English (elective)	3	Jour. 420 Law of the Press	3
Govt. 207 State & Local Govt.	3	Journalism (elective)	6
Jour. 409 Hist. & Prin. of Journalism	3	Spch. 403 Public Speaking	3
Elective	9	Elective	6
	18		18

NOTES: 1. See "General Requirements of the College of Liberal Arts," No. 3, page 88.

2. The student may select any one of the following: Chem. 106, Geog. 203, Geol. 205, Phys. 211.

3. It is recommended that the student select any one of the following: Engl. 325, 328, 340, 350, 371, 375.

- The Journalism Department has assembled information on the various areas of emphasis which will prove a valuable guide to a student planning his advanced course of study and choosing his electives at the beginning of the junior year.
- The Journalism Department, in cooperation with the daily newspapers, radio and television stations, and magazines of the area, offers a 10-week professional internship program for selected students who have demonstrated superior ability. These internships are available during the summer following the junior year.
- For further information on agricultural journalism, see page 43.

## Curriculum in MODERN LANGUAGES

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 <sup>1</sup> Gen. Botany of Seed Plants	3	Biol. 107 <sup>1</sup> Vertebrate Zoology	3
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	2
M.S. or A.S.	1	M.S. or A.S.	1
Mod.Lang. (Spanish)	3	Mod.Lang. (Spanish)	3
P.E. 101	R	Elective	2
	—	P.E. 102	R
	16		—
			18

### SOPHOMORE YEAR

Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 212 Shakespeare	3	Engl. 231 or 232 Survey of Engl. Lit.	3
M.S. or A.S.	1	M.S. or A.S.	1
Mod.Lang. (Spanish)	3	Mod.Lang. (Spanish)	3
Science <sup>2</sup>	4	Science <sup>2</sup>	4
Elective <sup>3</sup>	3	Elective <sup>3</sup>	3
P.E. 201	R	P.E. 202	R
	—		—
	17		17

### JUNIOR YEAR

Engl. 410 Hist. of English Lang.	3	Engl. 409 Intr. to Linguistics	3
Govt. 206 American National Govt.	3	Mod.Lang. (Spanish)	3
Mod.Lang. (Spanish)	3	Mod.Lang. (Fr., Germ., or Russ.)	3
Mod.Lang. (Fr., Germ., or Russ.)	3	Elective	9
Elective	5		—
	17		18

### SENIOR YEAR

History <sup>4</sup> Latin America	3	History <sup>4</sup> Latin America	3
Mod.Lang. (Fr., Germ., or Russ.)	3	Mod.Lang. (Fr., Germ., or Russ.)	3
Mod.Lang. (Spanish)	2	Mod.Lang. (Spanish)	2
Spch. 403 Public Speaking	3	Elective	9
Elective	6		—
	17		17

- NOTES: 1. Transfers who have credit for any 6 hours of college biology may substitute such credit for Biol. 101, 107.
2. See "General Requirements of the College of Liberal Arts," No. 4, page 88.
3. Students who intend to take three years of French, German, or Russian will begin the study of that language in the sophomore year in place of the 3 elective hours.
4. Either 6 hours of History of South America, 341 and 342; or 6 hours of History of Mexico, 413 and 414.
5. Students who begin the study of Spanish with M.L. 105 will take a 3-hour course in literature in the senior year and reduce electives by 3 hours.
6. Recommended electives: Advanced courses in economics, English, geography, history.
7. For most students majoring in modern languages, economics, English, geography, or history are logical minors.

## PHILOSOPHY AND HUMANITIES

Courses in philosophy are for students, majoring in any field, who wish to enrich their education by a deeper understanding of themselves, the world they experience, and the nature of human knowledge. Philosophy is the academic discipline that attempts to clarify and investigate these great issues of human experience, and to discover how far the human mind can go in determining solutions.

At present, the Department of Philosophy and Humanities does not offer a program leading to the bachelor's degree, but students may elect philosophy as their minor area of study.

The course offerings in philosophy have three purposes: (1) to acquaint students with the general nature of systematic, philosophical reasoning and with particular philosophical issues; (2) to introduce students to the history of philosophy, and to show its place in the history of civilization; and (3) to provide a balanced program of philosophical training for those who elect philosophy as a minor.

### Curriculum in PSYCHOLOGY

The degree program in psychology provides the necessary background for subsequent professional training at the graduate level, especially in the fields of industrial and experimental psychology. Alternately, it offers a broad scientific base for on-the-job training in the armed services or in industry.

#### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 107 <sup>1</sup> Vertebrate Zoology	3	Biology (elective) <sup>1</sup>	3
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
Elective	4	Elective	4
P.E. 101	R	P.E. 102	R
	17		17

#### SOPHOMORE YEAR

Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 212 Shakespeare	3	English (Literature elective)	3
Math. 104 Analytic Geometry	3	Govt. 206 American National Govt.	3
M.S. or A.S.	1	M.S. or A.S.	1
Psy. 207 <sup>2</sup> Gen. Psychology	3	Psychology (elective)	3
Science (Physical) <sup>3</sup>	4	Science (Physical) <sup>3</sup>	4
P.E. 201	R	P.E. 202	R
	17		17

#### JUNIOR YEAR

Econ. 318 Econ. of Labor	3	Educ. 439 <sup>4</sup> Educ. Statistics	3
Psy. 309 Differential Psychology	3	Engl. 301 Writing for Professional Men	3
Psychology (elective)	3	Psy. 406 Psy. of Learning	3
Soc. 205 Prin. of Sociology	3	Soc. 411 <sup>4</sup> Social Psychology	3
Or		Elective	5
Soc. 206 Social Inst. & Processes	3		
Elective	6		17
	18		

#### SENIOR YEAR

I.En. 404 Motion & Time Study	3	Psy. 401 Industrial Psychology	3
Psy. 403 Dynam. of Human Behavior	3	Psy. 408 Experimental Psychology	3
Psychology (elective)	3	Elective	11
Elective	8		17
	17		

NOTES: 1. If a transfer student has received credit for Biol. 115, he may enroll in Biol. 330 or Biol. 337, and meet the minimum requirement in biology. Transfers who have credit for any 6 hours of college biology may substitute such credit for Biol. 107 and the general elective in biology.



2. Psy. 303 may be substituted for Psy. 207.
3. A two-semester sequence course is required in physics or chemistry to meet the requirement in physical science.
4. Educ. 439 and Soc. 411 will count as hours in psychology.
5. Majors in psychology will select a minor area of concentration of 18 hours, at least 6 of which must be of advanced level.
6. Those who do not elect M.S. or A.S. may consider Educ. 101, 105, and 106 as electives.

## EDUCATION: PREPARATION FOR TEACHING

The Department of Education and Psychology offers a program in teacher education leading to the degree of either Bachelor of Science or Bachelor of Arts. The Bachelor of Arts degree requires twelve hours of modern language. Students desiring to teach in the public schools may choose to major either in education or in a subject-matter area such as biology or mathematics. Programs for both elementary and secondary school teaching are available.

Candidates for work in the teacher education fields should select their courses under the guidance of a departmental advisor. Students may be eligible to receive a teaching certificate upon completing the requirements for the Bachelor's degree and being recommended by the Department to the Texas Education Agency through the University's Council on Teacher Education. Completion of the requirements for the Bachelor's degree does not automatically assure the student that he will be recommended for a teaching certificate.

The Department of Education and Psychology also offers advanced undergraduate and graduate courses in preparation for certification at the professional level as classroom teachers, visiting teachers, counselors, supervisors, principals, and superintendents. To meet the requirements for the professional certificate, the student must have at least three years of successful teaching experience and must have completed an approved program of at least 30 semester hours of graduate work beyond the Bachelor's degree requirements.

Graduate work toward the professional certificate may be incorporated in a program for an advanced degree. The Department offers the following advanced degrees: Master of Science, Master of Education, and Doctor of Philosophy with options in either Educational Administration or Curriculum and Instruction. Further information about these degrees may be obtained from the Graduate College.

A student majoring in education or working toward the provisional or the professional certificate will be assigned an advisor who will counsel with him during his teacher education program. Before being fully admitted to a teacher education program, each student must file formal application for admission into teacher education. Formal admission is contingent upon a review of the student's academic and disciplinary records, a recommendation from his high school principal or counselor, a review of current test results, and a personal interview with a counselor in the Department.

## MAJORS IN EDUCATION

Education majors will follow the program outlined below:

### I. Academic Foundations

The academic foundations consist of 60 semester hours which constitute the basic institutional requirements for the Bachelor's degree. Included are at least 12 semester hours of English, 6 semester hours of American history, 3-6 hours of government, and 12 semester hours from two of the following: science, mathematics, foreign language.

### II. Academic Specialization

Three programs are offered. Programs 1 and 2 are secondary school plans. Program 3 is for those wishing to teach in the elementary school, grades one through eight. The student should select the program which will best serve his professional objectives.

**Program 1.** The student must complete at least 24 semester hours of concentration in each of two subject-matter areas identified with a field of teaching in the secondary schools (12 advanced hours in each). Teaching fields may be selected from the following: biology, business, chemistry, English, geography, government, health and physical education, history, journalism, mathematics, physics, and Spanish. The exact courses to be taken will be chosen with the guidance of the student's advisor and the approval of the head of the department concerned.

**Program 2.** The student must complete at least 48 semester hours in a composite secondary teaching field such as social studies or general science (18 advanced hours).

**Program 3.** Students wishing to teach in elementary school must complete at least 18 semester hours (9 semester hours advanced credit) in one of the following areas: biology, chemistry, physics, mathematics, English, history, geography, or modern language. The student must also complete an additional 18 semester hours from among content areas related to the elementary school curriculum including: art, music, geography, speech, health and physical education, with electives from the fields of English, history, and science.

### III. Professional Development

The professional development program consists of academic course work paralleled by direct contacts with youth in school, home, and community. This program includes observations made in connection with courses in psychology, instructional methods, curriculum, and testing. Serving as the capstone of the professional development program is supervised student teaching. During his student teaching, the student will assume the responsibilities for teaching elementary or secondary school classes. This work will be carried out under the joint supervision of a professional classroom teacher and a college supervisor who is a regular member of the faculty of the Department of Education and Psychology. Student teaching may not be taken prior to the student's senior year. Application for enrollment in student teaching must be made the semester prior to enrollment and approved by the student's advisor. The typical professional development program follows: Foundations in American Education (3 hrs.), Educational Psychology (3 hrs.), History and Philosophy of Education (3 hrs.), Child or Adolescent Psychology (3 hrs.), Elementary or Secondary School Curriculum (3 hrs.), Principles and Practices of Teaching (3 hrs.), Professional Electives (6 hrs.), Supervised Student Teaching (6 hrs.).

### IV. Electives

With the approval of his advisor, the student will select electives to satisfy the requirements of a total of 137 semester hours for the Bachelor's degree in Arts and Sciences.

The complete curriculum for education majors is outlined on page 100.

## MAJORS IN AREAS OTHER THAN EDUCATION

Students majoring in subject-matter departments and working toward a teaching certificate must meet the minimum requirements described below:

### I. Academic Foundations

Requirements are the same as those for education majors.

### II. Academic Specialization

Requirements are the same as those for education majors.

### III. Professional Development

The following eighteen semester hours of professional development courses are required of students working toward a secondary school certificate: Principles and Practices of Teaching (3 hrs.), Psychology for Secondary School Teachers (3 hrs.), History and Philosophy of Education (3 hrs.), Secondary School Curriculum (3 hrs.), Supervised Student Teaching (6 hrs.).

Students working on an elementary school certificate are required to complete the following 30 semester hours of professional development courses: Language Arts in the Elementary School (3 hrs.), Mathematics in the Elementary School (3 hrs.), Social Studies in the Elementary School (3 hrs.), Science in the Elementary School (3 hrs.), Educational Psychology (3 hrs.), Child Growth and Development (3 hrs.), Principles and Practices of Teaching (3 hrs.), Elementary School Curriculum (3 hrs.), Supervised Student Teaching (6 hrs.).

### IV. Electives

Additional courses in either professional development or in academic specialization may be elected by the student.

Curriculum in  
EDUCATION

## FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 Gen. Botany of Seed Plants	3	Biol. 107 Vertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	Or	
P.E. 101	R	Math. 110 Survey Course in Math.	3
	—	M.S. or A.S.	1
	17	Elective	1
		P.E. 102	R
			—
			18

## SOPHOMORE YEAR

Educ. 215 Foundations of Amer. Educ.	3	Econ. 203 Prin. of Economics	3
Engl. 203 Intr. to Literature	3	English (elective)	3
Or		M.S. or A.S.	1
Engl. 210 Argumentation	3	Psy. 301 Educational Psychology	3
M.S. or A.S.	1	Elective	7
Psy. 207 Gen. Psychology	3	P.E. 202	R
Elective	7		—
P.E. 201	R		17
	—		
	17		

## JUNIOR YEAR

Education (elective)	3	Govt. 207 State & Local Govt.	3
Govt. 206 American National Govt.	3	Psy. 323 Psy. of Adolescence	3
P.E. 213 Intr. to Health & P.E.	3	Soc. 206 Soc. Inst. & Processes	3
Elective	9	Elective	9
	—		—
	18		18

## SENIOR YEAR

Education (elective)	3	Educ. 421 Hist. & Phil. of Educ.	3
H.E. 415 Sec. School Health Educ.	3	Educ. 423 Prin. & Prac. of Tchg.	3
Spch. 403 Public Speaking	3	Educ. 425 Supervised Student Tchg.	6
Elective	9	Educ. 444 Sec. School Curriculum	3
	—		—
	18		15

- NOTES: 1. With the consent of the student's advisor, the following substitutions may be made in the program outlined above:
- Biological Sciences. A minimum of 6 hours of biological science is required. For Biol. 101 and 107, students may substitute Biol. 115 and either 330 or 337.
  - Physical Science. A minimum of 8 hours of physical science is required. For Chem. 101 and 102, students may substitute Phys. 201 and 202, or select 8 hours from these courses: Chem. 106, Phys. 211, Geol. 205, and Geog. 203.
  - Educ. 215. A student entering upon a certificate or degree program with junior or senior classification may substitute a more advanced course in education for Educ. 215.
  - P.E. 213, H.E. 415. A student may substitute approved courses in his teaching major or minor for P.E. 213 and/or H.E. 415.
- The English elective in the sophomore year should be chosen from literature courses. Students planning to teach English in the secondary schools may substitute for Engl. 203 or 210 a 3-hour English course chosen with the consent of the advisor. If a student writes unsatisfactorily, he may be required to take an additional course in writing, such as Engl. 301.
  - In choosing electives, the student should keep in mind the requirements of his subject-matter area of teaching specialization.
  - The following substitutions are permitted if approved by the student's advisor: Psy. 307 for Psy. 323; Educ. 443 for Educ. 444; H.E. 421 for H.E. 415.
  - Those who do not elect M.S. or A.S. may consider Educ. 101, 105, and 106 as electives at the freshman level. Sophomores may consider Phil. 301.

## HEALTH AND PHYSICAL EDUCATION

The Department of Health and Physical Education offers a major for the student interested in a career as a: (1) physical education teacher in secondary or elementary schools; (2) athletic coach of an interschool sport; (3) athletic trainer; or (4) corrective therapist. The Bachelor's degree is granted students who complete the prescribed



program of studies, and establish a second teaching major in one of the usual secondary school subject matter fields. The choice of a second teaching major may be made only with the approval of the Head of the Department of Health and Physical Education.

Upon completion of the prescribed curriculum and recommendation to the Texas Education Agency, the student will be eligible for (1) the Secondary School Certificate with teaching fields in Health and Physical Education and the selected second subject area and (2) the All-Grade Level Certificate in Health and Physical Education.

### Corrective Therapy

This program is offered in cooperation with the Veterans Administration to prepare specialists in rehabilitation through corrective therapy. This program includes a six-week clinical training period at the Veterans Administration Hospital in Houston. Graduates of this program find employment opportunities with the Veterans Administration, private hospitals, or other organizations concerned with physical rehabilitation.

## Curriculum in PHYSICAL EDUCATION

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 Gen. Botany of Seed Plants	3	Biol. 107 Vertebrate Zoology	3
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 <sup>1</sup> Hist. of United States	3	Hist. 106 <sup>1</sup> Hist. of United States	3
Math. 102 Algebra	3	M.S. or A.S.	1
M.S. or A.S.	1	P.E. 212 P.E. Activities	2
Soc. 205 Prin. of Sociology	3	Science <sup>2</sup>	4
P.E. 101	R	P.E. 102	R
	16		16

### SOPHOMORE YEAR

Biol. 219 Mammalian Anatomy	3	Biol. 220 Physiology & Hygiene	3
Econ. 203 Prin. of Economics	3	English <sup>3</sup> (elective)	3
English <sup>3</sup> (elective)	3	Govt. 207 State & Local Govt.	3
Govt. 206 American National Govt.	3	H.E. 218 Athletic Injuries	2
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 211 P.E. Activities	2	P.E. 221 Safety Education	2
P.E. 213 Intr. to Health & P.E.	3	P.E. 317 Coaching of Football	2
P.E. 201	R	Elective	2
	18	P.E. 202	R
			18

### JUNIOR YEAR

H.E. 216 First Aid	1	Educ. 423 Prin. & Pract. of Tchg.	3
H.E. 415 Sec. Sch. Health Education	3	H.E. 421 Elem. School Health Educ.	3
P.E. 316 Sec. School P.E.	3	P.E. 315 Elem. School P.E.	3
P.E. 427 Therapeutic Prin.	3	Psy. 307 <sup>4</sup> Child Growth & Development	3
Psy. 301 Educational Psychology	3	Elective	6
Elective	5		18
	18		

### SENIOR YEAR

P.E. 423 Admin. of Health & P.E.	3	Education (elective) <sup>4</sup>	3
P.E. 425 Tests & Measurements	3	P.E. 450 Directed Teaching	6
Psy. 323 Psy. of Adolescence	3	Spch. 403 Public Speaking	3
Elective	9	Elective	3
	18		15

- NOTES: 1. Hist. 325, 326 may be substituted for Hist. 105, 106.  
 2. Students may elect either Chem. 106, Geog. 203, Geol. 205, or Phys. 211.  
 3. Any 6 hours of literature courses may be elected.  
 4. Elective in Education may be chosen from: Educ. 421, 427, 439.

## THE SCHOOL OF BUSINESS ADMINISTRATION

### PROFESSIONAL FIELDS OF STUDY

Accounting  
Finance

Management  
Marketing

### GENERAL STATEMENT

The several curricula in business administration provide professional training for business careers. The freshman and sophomore years are the same in all curricula. The student elects a major field choosing one of the following: accounting, finance, management, marketing.

Each curriculum contains courses essential to a general education and permits the study of fundamental business theory and procedure with limited specialization in one of the major fields. No more than twelve hours of elective courses in business administration will be counted toward a degree. Upon the completion of his chosen curriculum, the student will receive the degree of Bachelor of Business Administration.

The objectives of the programs in the School of Business Administration are to challenge the student's intellectual curiosity, to develop analytic ability, and to provide current business information that will enable the graduate to successfully meet the challenges of a dynamic business society. These objectives are carried out with a variety of classroom methods, experimental courses, and realistic case problems in business.

### BASIC BUSINESS ADMINISTRATION PROGRAM

The course of study for the first two years is the same for all business administration professional fields. This course of study is mostly humanities and sciences.

#### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 115 Survey of Biology	4	Engl. 104 Composition & Rhetoric	3
Engl. 103 Composition & Rhetoric	3	Hist. 106 Hist. of United States	3
Hist. 105 Hist. of United States	3	Mgmt. 106 Bus. Organization	3
Mgmt. 105 Intr. to Business	3	Math. 110 Survey Course in Math.	3
Math. 102 Algebra	3	M.S. or A.S.	1
M.S. or A.S.	1	Science*	4
P.E. 101	R	P.E. 102	R
	17		17

#### SOPHOMORE YEAR

Acct. 227 Prin. of Accounting	4	Acct. 228 Prin. of Accounting	4
Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 212 Shakespeare	3	Engl. 231 or 232 Survey of English Lit.	3
Mgmt. 211 Business Law	3	Govt. 206 American National Govt.	3
M.S. or A.S.	1	Mgmt. 212 Business Law	3
Psy. 303 Psy. for Technical Students	3	M.S. or A.S.	1
P.E. 201	R	P.E. 202	R
	17		17

\*Students may elect one of the following: Chem. 106, Geog. 203, Geol. 205, Phys. 211.

### Curriculum in ACCOUNTING

The curriculum in accounting offers a professional course of training for employment in commercial and industrial accounting, public accounting, or governmental accounting. Positions in these fields are generally designated as accountant, public accountant, certified public accountant, tax accountant, auditor, cost accountant, internal auditor, and controller. The basic business training obtained in this curriculum also qualifies graduates for employment eventually leading to executive positions in industry.

### FRESHMAN AND SOPHOMORE YEARS

(See above)

## JUNIOR YEAR

First Semester	Credit	Second Semester	Credit
Acct. 327 Intermed. Accounting	3	Acct. 328 Intermed. Accounting	3
Acct. 329 Elem. Cost Accounting	3	Acct. 332 Cost Accounting	3
B.Ana. 303 Statistical Method	4	B.Ana. 304 Bus. Cycles & Bus. Measurements	3
Econ. 311 Money & Banking	3	Elective	9
Elective	4		18
	17		

## SENIOR YEAR

Acct. 330 Adv. Accounting	3	Acct. 403 Income Tax	3
Acct. 407 Auditing	3	Econ. 412 Public Finance	3
Fin. 341 Corporation Finance	3	Elective	11
Spch. 403 Public Speaking	3		17
Elective	5		
	17		

Curriculum in  
FINANCE

The curriculum in finance provides instruction in the principles, methods, instruments, and institutions of finance with specialized training in the techniques and practices of financial management. The student receives training in accounting, economics, business law, and elective fields, which provides a balanced background for specialization in finance.

The principal objective of the program is to prepare students for managerial positions in business finance, commercial banking, investment banking, securities brokerage, trust management, and property management. The program also provides training for employment with governmental agencies engaged in lending operations and regulation of securities markets.

## FRESHMAN AND SOPHOMORE YEARS

(See page 102)

## JUNIOR YEAR

Acct. 335 Administrative Accounting		B.Ana. 304 Bus. Cycles & Bus. Measurements	3
Or		Fin. 341 Corporation Finance	3
Math. 215 Finite Mathematics	3	Mktg. 321 Marketing	3
B.Ana. 303 Statistical Method	4	Elective	9
Econ. 311 Money & Banking	3		18
Fin. 315 Insurance	3		
Elective	4		
	17		

## SENIOR YEAR

Fin. 420 Prin. of Investment	3	Econ. 412 Public Finance	3
Mgmt. 363 Prin. of Management	3	Fin. 434 Prob. in Finance	3
Spch. 403 Public Speaking	3	Fin. 440 Real Estate Fundamentals	3
Elective	8	Elective	8
	17		17

Curriculum in  
MANAGEMENT

The coordination of human effort to achieve a common goal is necessary in all organized activity regardless of the type of institution involved. The particular job of management is one of coordinating the activities of individual members and groups in an organization by planning, organizing, motivating, and controlling.

Preparing students for business management positions is the principal objective of the curriculum in management. The four aspects of the field of management—management analysis, organization theory, management principles, and human rela-



tions—are explored in order to aid the student develop managerial skills. The curriculum is designed to give the student a broad background in business education and also to expose him to complex management problems which demand expert skill for analysis and solution.

## FRESHMAN AND SOPHOMORE YEARS

(See page 102)

### JUNIOR YEAR

First Semester		Credit	Second Semester		Credit
B.Ana. 303	Statistical Method	4	Acct. 335	Administrative Accounting	3
Econ. 311	Money & Banking	3	Or		
Mgmt. 363	Prin. of Management	3	Math. 215	Finite Mathematics	3
Mktg. 321	Marketing	3	B.Ana. 304	Bus. Cycles & Bus. Measurements	3
Elective		4	Fin. 341	Corporation Finance	3
		—	I.En. 403	Production Management	3
		17	Mgmt. 422	Personnel Probs. of Industry	3
			Elective		3
					18

### SENIOR YEAR

Econ. 318	Econ. of Labor	3	Mgmt. 423	Human Relations in Bus.	3
Mgmt. 459	Management Probs.	3	Mgmt. 466	Management Policy	3
Spch. 403	Public Speaking	3	Elective		11
Elective		8			—
		17			17

### Curriculum in MARKETING

The field of marketing is diversified in the scope of its opportunities. Typical of the fields in which expansion is taking place is retail merchandising. Its major departments include store management, buying, publicity, merchandise planning, research, and personnel work. Market research will make increased demands upon those able to furnish management with the data necessary to keep abreast of marketing changes, to eliminate wasteful marketing methods, and to develop new products. The field of sales administration requires an ever-increasing number of individuals qualified to recruit, select, and train selling personnel. Also in this area lie the important functions of establishing sales territories, setting, sales quotas, and sales costing. Personal selling is a field offering many opportunities for employment. In the field of advertising a student may gain added proficiency by electing courses taught in the Department of Journalism.

By careful selection of electives, a student can specialize in one of the different fields of marketing or gain general knowledge in anticipation of starting his own business.

## FRESHMAN AND SOPHOMORE YEARS

(See page 102)

### JUNIOR YEAR

Acct. 335	Administrative Accounting	3	B.Ana. 304	Business Cyc. & Bus. Measurements	3
Or			Econ. 311	Money & Banking	3
Math. 215	Finite Mathematics	3	Fin. 341	Corporation Finance	3
B.Ana. 303	Statistical Method	4	Mktg. 314	Advertising	3
Geog. 204	Economic Geography	3	Mktg. 325	Retailing	3
Mktg. 321	Marketing	3	Elective		3
Elective		4			—
		17			18

### SENIOR YEAR

Mktg. 435	Salesmanship	3	Mktg. 436	Sales Management	3
Or			Spch. 403	Public Speaking	3
Mktg. 448	Marketing Problems	3	Elective		11
Mktg. 445	Marketing Research	3			—
Elective		11			17
		17			

# *The College of Science*

## ADMINISTRATIVE OFFICERS

C. M. Zener, A.B., Ph.D. .... Dean  
C. F. Squire, Ph.D. .... Associate Dean

## GENERAL STATEMENT

The scientist at the undergraduate level must have the foundations of his discipline in depth and have been held accountable for his competence. Not only is there dignity and importance in the mastery of useful knowledge but there is value in the self-reliance which the rigorous training gives the student. A proper blending of courses from the liberal arts and from engineering is deemed important to achieve a well rounded, inspired student. Graduate education in science introduces the advanced student to research—the activity which brings about the discovery of new facts.

The need for scientists in the Nation and especially in the Southwest is evident to all men. The demand in Texas for scientists at all levels of education and in all disciplines far exceeds the present supply from this region of the nation. It is to the economic self advantage of the peoples of Texas to invest heavily in the training of young scientists, and this is the direction taken at Texas A&M University.

## Organization for Instruction

Instruction in the College of Science is offered in four departments: Biology, Chemistry, Mathematics, and Physics. A Bachelor of Science degree may be earned in Botany, Microbiology, Zoology, Entomology, Chemistry, and Physics. The Bachelor of Arts degree may be earned in the field of Mathematics and this degree requires the selection of a minor field of study. A minor field is defined as 18 semester hours of credit in one discipline, of which 6 hours must be advanced courses.

The student who majors in Chemistry, Mathematics, or Physics will satisfy the foreign language requirement of his curriculum by completing four semesters of study in one language.

Attention is called to the curriculum in Pre-Medicine and Pre-Dentistry which may lead to satisfying requirements to enter a College of Medicine or Dentistry. This curriculum may earn a Bachelor of Science degree from Texas A&M University after one year in such a professional college provided the proper credit hours are completed.

In the Graduate College, the College of Science participates with Master of Science and Doctor of Philosophy degrees in each of the curricula.

## Combined Degree Plan

Students may pursue a five year program which combines professional training in science with a broad general education to qualify for two degrees. Students who are interested in such a program should maintain a grade point ratio well above the normal minimum requirements and consult with the Dean of Science prior to formulating a combined degree plan. In all combined degree programs, the total amount of credit required must be at least 30 semester hours additional to the greater number required for either degree.

## Electives

Students in science curricula elect a variety of courses in other departments of the University, subject to the approval of the Dean of Science.

## English Proficiency Examination

In order to qualify as a candidate for a degree in the College of Science, each student must demonstrate his ability to express himself in acceptable English by passing an examination in English composition. This examination must be taken not later than the spring semester of the junior year and will be administered by the student's major department. Each student who fails to make a passing grade will be required to complete remedial work with the Department of English without degree credit. Only if the Department of English has certified satisfactory completion of the remedial work and if the student has passed his examination, will he be granted regular status as a degree candidate.

## The Honors Program

The College of Science, the College of Liberal Arts, and the College of Geosciences jointly sponsor an Honors Program designed to offer the superior student special opportunities for academic work of a range and depth appropriate to his capabilities and greater intellectual interests. For further information regarding the Honors Program, refer to page 89.

### Curriculum in BOTANY

The curriculum in botany is designed to provide the student with a sound background in the basic concepts of the science and supporting fields. It is designed to lead to graduate studies and a career in one of the various botanical sciences, either in research or college teaching or both. Students earning bachelor's degrees in botany are equipped for high school teaching or work in the various botanical sciences.

#### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 107 Vertebrate Zoology	3	Biol. 108 Invertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	Elective	1
	17	P.E. 102	R
			18

#### SOPHOMORE YEAR

Biol. 101 Gen. Botany of Seed Plants	3	Biol. 102 Taxonomy of Flowering Plants	3
Chem. 316 Quantitative Analysis	2	Biol. 327 Fund. Plant Morphology	3
Chem. 319 Quant. Anal. Lab.	2	Chem. 317 Quant. Analysis	2
Engl. 203 Intr. to Literature	3	Chem. 320 Instrum. Anal. Lab.	2
Math. 104 Analytic Geometry	3	Engl. 210 Argumentation	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 201 College Physics	4	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	18		18

#### JUNIOR YEAR

Biol. 206 Intr. Microbiology	3	Chem 228 Organic Chemistry	4
Chem. 227 Organic Chemistry	4	Gen. 301 Genetics	4
Geog. 203 Physical Geography	4	Mod.Lang. (French or German)	3
Mod.Lang. (French or German)	3	P.P.P. 313 Intr. to Plant Physiology	3
Elective	3	Elective	3
	17		17

#### SENIOR YEAR

Biol. 453 Plant Anatomy	3	Biol. 482 Seminar	1
Biol. 481 Seminar	1	Biology (Botany elective)	3
Econ. 203 Prin. of Economics	3	Mod.Lang. (French or German)	3
Govt. 206 American National Govt.	3	Spch. 403 Public Speaking	3
Mod.Lang. (French or German)	3	Stat. 406 Statistical Methods	3
Elective	4	Elective	4
	17		17

### Curriculum in CHEMISTRY

The Department of Chemistry offers training in the various branches of chemistry for the degrees of Bachelor of Science, Master of Science, and Doctor of Philosophy.

Undergraduate programs are so arranged that a student in chemistry has a solid foundation in all phases of chemistry. The student whose goal is research is strongly advised to consider advanced degrees.

Employment opportunities for graduates at all degree levels are excellent. Graduates find such opportunities in teaching, laboratory, and industrial applications.



## FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Chem. 103 <sup>1</sup> Chemical Principles	4	Chem. 104 <sup>1</sup> Chemical Principles	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Math. 121 Analytic Geom. & Calculus	4
Math. 102 Algebra	3	M.S. or A.S.	1
Math. 103 Plane Trigonometry	3	Phys. 218 Mechanics & Heat	4
M.S. or A.S.	1	P.E. 102	R
P.E. 101	R		16
	17		

## SOPHOMORE YEAR

Biol. 115 Survey of Biology	4	Chem. 228 Organic Chemistry	4
Chem. 226 Chemical Calculations	2	Engl. 210 Argumentation	3
Chem. 227 Organic Chemistry	4	Hist. 106 Hist. of United States	3
Math. 122 Calculus	4	Math. 307 Calculus	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	19		18

## JUNIOR YEAR

Chem. 316 Quantitative Analysis	2	Chem. 317 Quantitative Analysis	2
Chem. 319 Quant. Anal. Lab.	2	Chem. 320 Instrum. Anal. Lab.	2
Chem. 323 Physical Chemistry	3	Chem. 324 Physical Chemistry	3
Chem. 325 Phys. Chem. Lab.	1	Chem. 326 Phys. Chem. Lab.	1
Econ. 203 Prin. of Economics	3	Chem. 380 Chemical Bibliography	1
Mod.Lang. <sup>2</sup> (French or German)	3	Engl. 203 Intr. to Literature	3
Elective	3	Mod.Lang. <sup>2</sup> (French or German)	3
	17	Elective	1
			16

## SENIOR YEAR

Chem. 447 Qual. Organ. Analysis	4	Chem. 464 Nuclear & Radiochem.	3
Chem. 461 Physical Chemistry	3	Chem. 481 Seminar	1
Chem. 462 Inorganic Chemistry	3	Govt. 206 American National Govt.	3
Engl. 301 Writing for Professional Men	3	Mod.Lang. <sup>2</sup> (French or German)	3
Mod.Lang. <sup>2</sup> (French or German)	3	Elective	6
Elective	2		16
	18		

- NOTES: 1. Students not meeting the requirements for Chem. 103, 104 may substitute Chem. 101, 102.
2. See the foreign language requirement, page 105.
3. A program combining the basic requirements for a Bachelor of Science degree in chemistry with premedical requirements is available. Students completing this four-year program will receive a degree certified by the American Chemical Society and at the same time satisfy all the premedical requirements. Mimeographed copies of this program are available at the Department of Chemistry and from the Chairman of the College Premedical Committee in the Department of Biology.

Curriculum in  
ENTOMOLOGY

The curriculum in entomology in the College of Science is designed for those students who wish to major in the science but are desirous of obtaining more basic training in biology, chemistry, physics, and mathematics than is provided for in the curriculum of the College of Agriculture. Foreign language is also required. Upon graduation the students are well prepared for graduate studies and have excellent training for careers in research, teaching, business, or industry.

## FRESHMAN YEAR

Biol. 107 Vertebrate Zoology	3	Biol. 108 Invertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	Elective	1
	17	P.E. 102	R
			18

## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 Gen. Botany of Seed Plants	3	Biol. 206 Intr. Microbiology	3
Engl. 212 Shakespeare	3	Econ. 203 Prin. of Economics	3
Ento. 201 Gen. Entomology	3	Engl. 231 or 232 Survey of English Lit.	3
M.S. or A.S.	1	M.S. or A.S.	1
Mod.Lang. <sup>1</sup>	3	Mod.Lang. <sup>1</sup>	3
Phys. 201 College Physics	4	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	17		17

## JUNIOR YEAR

Chem. 227 Organic Chemistry	4	Chem. 228 Organic Chemistry	4
Ento. 301 Systematic Entomology	3	Engl. 301 Writing for Professional Men	3
Ento. 305 Insect Morphology	3	Ento. 302 Systematic Entomology	3
Mod.Lang. <sup>1</sup>	3	Ento. 306 Insect Physiology	3
Elective	3	Mod.Lang. <sup>1</sup>	3
	16	Elective	2
			18

## SENIOR YEAR

Ento. 401 Prin. of Insect Control	3	Ento. 402 Gen. Economic Entomology	3
Ento. 423 Medical Entomology	3	Ento. 424 Insect Ecology	3
P.P.P. 301 Plant Pathology	3	Gen. 301 Genetics	4
Spch. 403 Public Speaking	3	Govt. 206 American National Govt.	3
Elective	5	Elective	4
	17		17

- NOTES: 1. See the foreign language requirement, page 105
2. Elective hours and the remaining hours for the major should be selected from the elective courses following the zoology curriculum, page 112.

Curriculum in  
MATHEMATICS

The curriculum in the Department of Mathematics is designed to give the student a broad liberal education as well as to provide him with the essentials for a career in mathematics

The demand for pure mathematicians as well as applied mathematicians has recently become very great in industry, government, and university work. This demand is found at the bachelor's, master's, and doctor's levels. The Department of Mathematics offers programs in pure and applied mathematics, including numerical analysis, to help meet this demand.

## FRESHMAN YEAR

Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Math. 121 Anal. Geom. & Calculus	4
Math. 102 Algebra	3	M.S. or A.S.	1
Math. 103 Plane Trigonometry	3	Phys. 218 Mechanics & Heat	4
M.S. or A.S.	1	P.E. 102	R
P.E. 101	R		
	17		16

## SOPHOMORE YEAR

Biol. 115 Survey of Biology	4	Engl. 231 or 232 Survey of English Lit.	3
Engl. 212 Shakespeare	3	Hist. 106 Hist. of United States	3
Math. 122 Calculus	4	Math. 307 Calculus	3
M.S. or A.S.	1	M.S. or A.S.	1
Mod.Lang. (Fr., Germ., Russ., or Span.)	3	Mod.Lang. (Fr., Germ., Russ., or Span.)	3
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	19		17

## JUNIOR YEAR

First Semester		Credit	Second Semester		Credit
Econ. 203	Prin. of Economics	3	Econ. 204	Prin. of Economics	3
Govt. 206	American National Govt.	3	Mathematics	(elective)	6
Math. 308	Differential Equations	3	Mod.Lang.	(Fr., Germ., Russ., or Span.)	3
Mod.Lang.	(Fr., Germ., Russ., or Span.)	3	Elective		5
Elective		5			17
		17			

## SENIOR YEAR

Mathematics (elective)	3	Mathematics (elective)	3
Spch. 403 Public Speaking	3	Elective	14
Elective	11		<hr/>
	17		17

- NOTES: 1. The minor field of study should be chosen only after consultation with the Head of the Department of Mathematics, who will help the student arrange a program appropriate to his plans following graduation.
2. Students planning to enter the Graduate College should elect Math. 409 and 415.

Curriculum in  
MICROBIOLOGY

A major in microbiology offers thorough and comprehensive training in the biology of bacteria and certain of the algae, fungi, and protozoa that supplement the study of the microorganisms in their relation to medicine, industry, and agriculture. The curriculum is intended to equip the student with sound training in the principles of microbial life, as either preparation for graduate study or for a career in either industrial or civil service.

## FRESHMAN YEAR

Biol. 107	Vertebrate Zoology	3	Biol. 108	Invertebrate Zoology	3
Chem. 101	Gen. Chemistry	4	Chem. 102	Gen. Chemistry	4
Engl. 103	Composition & Rhetoric	3	Engl. 104	Composition & Rhetoric	3
Hist. 105	Hist. of United States	3	Hist. 106	Hist. of United States	3
Math. 102	Algebra	3	Math. 103	Plane Trigonometry	3
M.S. or A.S.		1	M.S. or A.S.		1
P.E. 101		R	Elective		1
		17	P.E. 102		R
					18

## SOPHOMORE YEAR

Biol. 101	Gen. Botany of Seed Plants	3	Biol. 206	Intr. Microbiology	3
Chem. 227	Organic Chemistry	4	Chem. 228	Organic Chemistry	4
Engl. 210	Argumentation	3	Econ. 203	Prin. of Economics	3
Math. 104	Analytic Geometry	3	Engl. 231 or 232	Survey of English Lit.	3
M.S. or A.S.		1	M.S. or A.S.		1
Phys. 201	College Physics	4	Phys. 202	College Physics	4
P.E. 201		R	P.E. 202		R
		18			18

## JUNIOR YEAR

Biology (Microbiol. elective) <sup>1</sup>	4	Biology (Microbiol. elective) <sup>1</sup>	4
Chem. 316 Quantitative Analysis	2	Chem. 317 Quantitative Analysis	2
Chem. 319 Quant. Anal. Lab.	2	Chem. 320 Instrum. Anal. Lab.	2
Govt. 206 American National Govt.	3	Mod.Lang. (Fr., Germ., or Russ.)	3
Mod.Lang. (Fr., Germ., or Russ.)	3	Elective	6
Elective	3		17
	17		

## SENIOR YEAR

B.N. 410	Intr. Biochemistry	4	Biol. 482	Seminar	1
Biol. 481	Seminar	1	Biology (Microbiol. elective) <sup>1</sup>		4
Biology (Microbiol. elective) <sup>1</sup>		4	Gen. 301	Genetics	4
Mod.Lang.	(Fr., Germ., or Russ.)	3	Mod.Lang.	(Fr., Germ., or Russ.)	3
Elective		4	Spch. 403	Public Speaking	3
		16	Elective		3
					18



- NOTES: 1. Microbiology electives may be satisfied by B.N. 430; Biol. 327, 353, 438, 457, 608, 630, 647; Chem. 342; D.S. 320, 326; Stat. 406. Selections should be made with the aid of the student's advisor.
2. A program combining the basic requirements for a Bachelor of Science degree in Microbiology with premedical requirements is available from the Chairman of the University Premedical Committee in the Department of Biology, (See page 111.)

### Curriculum in PHYSICS

Physics is a fundamental science that deals with energy and matter and their interactions. Its discoveries and laws are basic to real understanding in all areas of science and technology. Some physicists concern themselves primarily with the investigation of fundamental physical phenomena that have not been previously studied or are not well understood. Others may be more interested in making new applications of known physical principles to the solution of industrial and technical problems.

Almost all physicists are employed in industrial laboratories, government laboratories, non-profit research organizations, or educational institutions. Their activities fall into four main categories: research, development and design, teaching, and management or administration. The demand for physicists at all levels of training, from the bachelor's through the Ph.D. degree, far exceeds the supply; and the indications are that this situation will continue to exist for many years.

The undergraduate curriculum in physics offers the student not only a thorough coverage of the phenomena of classical, atomic, nuclear, solid state, and space physics, but also the opportunity of developing his mathematical tools to the point where he can deal resourcefully and constructively with these phenomena. It also provides a grounding in related sciences, linguistic techniques, and general education. Elective time permits further broadening of the student's education or a degree of concentration in some related phases of science or engineering.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 115 Survey of Biology	4	Chem. 102 Gen. Chemistry	4
Chem. 101 Gen. Chemistry	4	Engl. 104 Composition & Rhetoric	3
Engl. 103 Composition & Rhetoric	3	Math. 122 <sup>1</sup> Calculus	4
Math. 121 <sup>1</sup> Analytic Geom. & Calculus	4	M.S. or A.S.	1
M.S. or A.S.	1	Phys. 218 Mechanics & Heat	4
P.E. 101	R	P.E. 102	R
	16		16

### SOPHOMORE YEAR

Engl. 203 Intr. to Literature	3	Hist. 106 Hist. of United States	3
Hist. 105 Hist. of United States	3	Math. 308 Differential Equations	3
Math. 307 Calculus	3	M.S. or A.S.	1
M.S. or A.S.	1	Modern Language <sup>2</sup>	3
Modern Language <sup>2</sup>	3	Phys. 220 Modern Physics	4
Phys. 219 Sound, Light, Electricity	4	Elective (Literature or Other Human.)	3
P.E. 201	R	P.E. 202	R
	17		17

### JUNIOR YEAR

Math. 405 Vector Analysis	3	Modern Language <sup>2</sup>	3
Modern Language <sup>2</sup>	3	Phys. 326 Physics Lab.	1
Phys. 302 Physical Mechanics	3	Phys. 405 Physical Mechanics	3
Phys. 311 Quantum Physics	3	Phys. 413 Electricity & Magnetism	3
Phys. 325 Physics Lab.	1	Phys. 435 Class. Quant. Wave Mechanics	3
Electives <sup>3</sup>	5	Electives <sup>3</sup>	4
	18		17

### SENIOR YEAR

Econ. 203 Prin. of Economics	3	Govt. 206 American National Govt.	3
Engl. 301 Writing for Professional Men	3	Phys. 408 Thermo. & Stat. Mechanics	3
Phys. 412 Intr. to Quant. Mechanics	3	Phys. 417 Radiation & Optics	3
Phys. 416 Electromagnetic Fields	3	Phys. 426 Physics Lab.	1
Phys. 425 Physics Lab.	1	Electives <sup>3</sup>	3
Electives <sup>3</sup>	5		18
	18		18

NOTES: 1. An entering student not thoroughly grounded in the fundamentals of algebra and trigonometry is urged to attend summer school prior to the fall semester and take courses equivalent to Math. 102-103 at Texas A&M University. A student not proficient in algebra and trigonometry who is unable to attend summer school should take Math. 102-103 in the fall semester and Math. 121 in the spring semester. It would then be highly desirable that he take Math. 122 in the subsequent summer term in order to resume the regular schedule in the fall semester of the sophomore year.

2. See the foreign language requirement, page 105. German or Russian is normally recommended.

3. Not more than 6 of the elective hours that are to be applied toward degree credit may be in physics.

Electives are usually of more value to the student if they are concentrated in a few areas, in which some degree of proficiency or insight at a fairly advanced level may be achieved. Therefore, with his electives, the student would include sequences in which advanced courses have more elementary courses as prerequisites. The student should choose some of his electives from the liberal arts in order to improve his cultural background and better fit himself for intelligent citizenship in the modern social order. Since the physicist of today is expected to have some acquaintance with the other sciences and with certain of the technologies, the student, depending upon his own interests and aspirations, may well choose the remainder of his electives from those contiguous fields. Courses such as E.G. 105 and 106, M.E. 309 and 310, E.E. 201, C.E. 201 and 315, and higher level courses in the engineering curricula are acceptable electives.

The extreme need for teachers of physics in the secondary schools leads some graduates in physics into the professionally rewarding field of high school teaching. The student preparing for such a career should elect the requisite courses in education.

### Curriculum in PRE-MEDICINE AND PRE-DENTISTRY

America needs many, many more young physicians, dentists, pharmacists, medical technicians, and other members of the "health team" to maintain and protect its health—in family practice, specialization, research, teaching, public health, the armed forces, industrial health, administration, school health, and in government.

Students planning to enter a school of medicine, dentistry, or some other professional area connected with the "health team" without first taking a college degree should take the following program:

#### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 107 Vertebrate Zoology	3	Biol. 108 Invertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	17		17

#### SOPHOMORE YEAR

Biol. 217 Comp. Anatomy of Vertebrates	3	Biol. 218 Comp. Anatomy of Vertebrates	3
Chem. 227 Organic Chemistry	4	Chem. 228 Organic Chemistry	4
Engl. 212 Shakespeare	3	Engl. 231 or 232 Survey of English Lit.	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language	3	Modern Language	3
Phys. 201 College Physics	4	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	18		18

#### JUNIOR YEAR

Biology (elective)	3	Biology (elective)	3
Chem. 316 Quantitative Analysis	2	Govt. 207 State & Local Govt.	3
Chem. 319 Quant. Anal. Lab.	2	Modern Language	3
Econ. 203 Prin. of Economics	3	Science (elective) <sup>2</sup>	4
Govt. 206 American National Govt.	3	Spch. 403 Public Speaking	3
Modern Language	3	Elective <sup>4</sup>	3
Psy. 207 Gen. Psychology	3		
	19		19

NOTES: 1. Most students admitted to medical and dental schools in the United States have three or more years of pre-professional training. A large proportion hold college degrees. It is therefore recommended that students preparing to enter medical or dental schools plan to complete at least the foregoing three-year program.

2. Four years of college work with the receipt of the baccalaureate degree is the preferred preparation for medical and dental schools. Majors may be obtained in zoology (See below) or chemistry (See page 106), and also in physics, microbiology, history, English, and other subjects so long as the requirements for entrance to the professional school are satisfied.
3. A student may qualify for the Bachelor of Science degree from Texas A&M University by completing the three-year premedical-predental curriculum on the Texas A&M Campus and at least one full year of acceptable work at an American medical school or dental school.
4. Since courses in literature, language, history, and social sciences are not offered in medical or dental schools, leaders in medical education urge prospective medical and dental students to include much of such work in their pre-professional education. Such electives in line with this recommendation should be junior and senior courses selected in consultation with the chairman of the premedical-predental committee.
5. Science electives may be satisfied by taking Chem. 342, B.N. 410, or Gen. 301.

### Curriculum in ZOOLOGY

The zoology curriculum is aimed at the training of premedical and predental students majoring in zoology, and of zoology majors who expect to teach in secondary schools or enter research fields in marine biology, aquatic ecology, or other similar areas. Graduates may also enter advanced graduate studies in radiation, biology, physiology, parasitology, or marine or freshwater ecology.

#### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 107 Vertebrate Zoology	3	Biol. 108 Invertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	<hr/> 17		<hr/> 17

#### SOPHOMORE YEAR

Biol. 101 Gen. Botany of Seed Plants	3	Biol. 218 Comp. Anatomy of Vertebrates	3
Biol. 217 Comp. Anatomy of Vertebrates	3	Econ. 203 Prin. of Economics	3
Engl. 212 Shakespeare	3	Engl. 231 or 232 Survey of English Lit.	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>1</sup>	3	Modern Language <sup>1</sup>	3
Phys. 201 College Physics	4	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	<hr/> 17		<hr/> 17

#### JUNIOR YEAR

Biol. 351 Fund. of Microbiol.	4	Biology (Zoology elective)	3
Biology (Zoology elective)	3	Chem. 223 Organic Chemistry	4
Chem. 227 Organic Chemistry	4	Gen. 301 Genetics	3
Govt. 206 American National Govt.	3	Modern Language <sup>1</sup>	3
Modern Language <sup>1</sup>	3	Elective	3
	<hr/> 17		<hr/> 17

#### SENIOR YEAR

Biol. 481 Seminar	1	Biol. 482 Seminar	1
Biology (Zoology elective)	4	Biology (Zoology elective)	4
Spech. 403 Public Speaking	3	Elective	13
Elective	9		<hr/> 18
	<hr/> 17		

NOTES 1. See the foreign language requirement, page 105

2. The elective hours in Zoology must include 4 courses chosen from the following: Biol. 343, 344, 422, 433, 434, 435, and 436.

3. Elective hours and the remaining hours required for the major should be selected in consultation with the Head of the Department.



# *The School of Military Sciences*

The national interest makes it apparent that every able young American must recognize and support an obligation to defend his country. The military program at Texas A&M University presents an opportunity to coordinate military and civilian career plans leading to a regular or reserve commission. President Kennedy stated the case succinctly, "Ask not what your country can do for you. Ask what you can do for your country."

## AIR SCIENCE

The Air Force ROTC program is designed to prepare selected students to be commissioned officers in the United States Air Force.

The institutional phase of Air Force ROTC, called Air Science, is divided into two parts. The first two years constitute the General Military Course and the second two years constitute the Professional Officer Course. A student may obtain a commission through one of three distinct programs: the four-year program, the two-year program, or the Financial Assistance Program (scholarship). Details on courses offered are set forth in the alphabetical departmental listing.

The General Military Course examines the causes of contemporary world conflict, Department of Defense organization, and the mission, organization, and capabilities of the United States Air Force. Finally, it prepares the cadet as a candidate for the Professional Officer Course. Enrollment is limited to students who are citizens of the United States, physically and mentally qualified for military training in the Air Force ROTC, loyal to the United States, and of good moral character. Cadets in the General Military Course attend one hour of class a week; those in the second year attend class for two hours each week.

Leadership training is continuous during the student's life as an Air Force ROTC cadet. In addition to rudimentary military training provided to underclass cadets by unit commanders, each cadet, under the supervision of an Air Force officer, receives training designed to develop leadership potential and knowledge of Air Force fundamentals. He attends career briefings conducted by Air Force junior and senior officers and studies the professional aspects of a career in the Air Force. He participates in orientation visits to Air Force bases and is provided opportunity to fly in Air Force aircraft. Indoctrination in military courtesy, respect for authority, and self-discipline are integral parts of the Air Force ROTC program.

Students apply for enrollment in the Professional Officer Course during the sophomore year. After taking the Air Force Officer Qualification Test, those who pass are interviewed by a board of senior officers. Those selected are further screened by a physical examination administered by a USAF hospital. Enrollment in the Professional Officer Course at the beginning of the junior year is limited to students of high moral character who are physically qualified, possess the necessary interest, intelligence and aptitude, have demonstrated leadership potential, and are well qualified academically. Those who are accepted are enrolled in the Air Force Reserve.

The purpose of the Professional Officer Course is to develop in the cadet skills and attitudes that are vital to his career as a professional Air Force officer. Graduation and a degree are prerequisites to a commission in the Air Force.

Cadets attend class three hours a week during each semester of the Professional Officer Course. In the summer between the first and second years of the Professional Officer Course, cadets in the **four-year program** attend a four-week Field Training course at an Air Force base. They receive \$112, plus a round-trip travel allowance of six cents a mile. During an intensive field training phase, cadets observe the Air Force in operation and become familiar with equipment, procedures, and systems.

As a prerequisite for selection for the two-year Professional Officer Course, junior college transfer students and other students who have not taken the General Military Course must complete a six-week Field Training course at an Air Force base during the summer before entering the course. Pay during the six-week field training period is \$78 a month with a travel allowance of six cents a mile. Candidates for the two-year Professional Officer Course must meet the same high standards required of cadets in the four-year program. A limited quota has been placed on total enrollment

in the two-year program. Selection will be made on a best-qualified basis by a central selection board.

If a student is selected for and enrolls in the Professional Officer Course, he must sign a contract with the government in which he agrees to enlist in the Air Force Reserve, complete the course, complete the field training, and upon graduation, accept a commission as an officer in the Air Force, if tendered. The foregoing become an integral part of the degree requirements of the University. He must also agree to serve on active duty for not less than four years after being commissioned, or if applying for flight training as either a pilot or a navigator, to serve on active duty for not less than four years after completion of flight training. Flight training takes approximately one year. Cadets in this course are exempted for Selective Service draft. Cadets in the non-scholarship program receive \$800 retainer pay from the Air Force during their two years in the Professional Officer Course. No charge is made for uniforms which are provided by the U. S. Air Force. The total amount of retainer pay, uniforms and pay and allowances, is approximately \$1,050.

In addition to the four-year and the two-year non-scholarship programs, a limited number of students will be selected competitively for the Financial Assistance Program (scholarship). In addition to pay and travel allowances received for attending the four-week Field Training course, the U. S. Air Force pays the cadets \$50 monthly retainer pay for not more than 20 months, and the cost of tuition, fees, books, and uniforms.

During his senior year, a cadet who has applied for Air Force pilot training after graduation is given up to 36½ hours of flight training in light aircraft and 35 hours of ground school. Flight training is provided at the University by an FAA-approved flying school operator, and upon successful completion, the student is eligible for a private pilot's license.

Upon completion of the Professional Officer Course and graduation from the University, students are commissioned as second lieutenants in the United States Air Force Reserve. Those who are designated Distinguished Graduates are eligible for commissions in the Regular Air Force.

All instructors are active duty officers assigned to the University by the United States Air Force. Information about the Air Force ROTC program may be obtained by writing directly to the Department.

## MILITARY SCIENCE

Military Science offers both the four-year and the Army's new two-year Advanced Course ROTC program. The new two-year ROTC program offers college men who have not taken the two years of Basic ROTC an opportunity to be commissioned as second lieutenants after only two years of on-campus ROTC training. This two-year program is particularly designed for students who have transferred to the university from junior colleges or other colleges or universities and who have not taken the Basic Course of ROTC. A student qualified for this program is required to satisfactorily complete a basic summer camp of six-weeks' duration between his sophomore and junior years. He then follows the same ROTC program as a cadet in the last two years (Advanced Course) of the four-year ROTC program.

If a student is selected for enrollment in the Advanced Course, he must agree to complete the Advanced Course, complete the ROTC Summer Camp, and accept a reserve commission if one is tendered. He must also agree that, after being commissioned and subject to the orders of the Secretary of the Army, he will serve on active duty for not less than two years or on active duty for training for not more than six months.

The objective of the course of instruction is to produce junior officers who, by their education, training, and inherent qualities, are suitable for continued development as officers in the United States Army. The Army ROTC Program is a General Military Science curriculum, and instruction covers military fundamentals common to all branches of the service. The aim of the program is to provide a basic military education, and, in conjunction with other University disciplines, to develop individual character and attributes essential to an officer.

Senior cadets who have demonstrated outstanding military aptitude and academic proficiency are designated Distinguished Military Students and are graduated as Distinguished Military Graduates. These cadets may apply for and receive a Regular Army commission similar to a commission tendered from one of the service academies.

The Military Science program provides an Army Flight Training Program to senior cadets who may be qualified and are selected. During his senior year a cadet selected for this training is given up to 36½ hours of flight training in light aircraft and 35 hours of ground school. Flight training is provided at the University by an FAA-approved flying school operator, and upon successful completion, the student is eligible for a private pilot's license. Following commissioning, those who have successfully completed the Flight Training Program at the University will receive additional Army aviation flight training during their tour of active duty followed by an Army aviation assignment.

Branch assignments for regular and reserve commissions will be made by the Department of the Army. These assignments will be based on the curriculum of the cadet's major field of study, his preference, his demonstration of leadership, and his technical qualifications. Cadets will select three branches in order of preference; and, if physically qualified for a commission in the combat branches, one selection must be a combat arm.

### THE ARMY'S ARMS AND SERVICES

The Army is organized along functional lines. That is to say, it is organized both administratively and tactically in a manner suited to its needs. Because of the need for occupational specialization, the Army categorizes its personnel by broad functional areas known as branches. Certain branches are made up of basic combat specialists which the nature of modern military operations make necessary for the successful conduct of warfare. These basic combat specialties are: Infantry, Armor, and Artillery.

The Engineer and Signal Branches have dual roles—both in a combat and in a technical area.

Other basic branches, of a technical or administrative service nature, include: the Quartermaster Corps, the Ordnance Corps, the Chemical Corps, the Transportation Corps, the Military Police Corps, the Adjutant General Corps, the Army Intelligence and Security Branch, and the Finance Corps.

Special branches made separate based on professional functions of the Army are: the Chaplains, the Judge Advocate General's Corps, and the Army Medical Service, which includes the Medical, the Dental, the Veterinary, the Medical Service Corps, and the Army Medical Specialists' Corps.



# *The College of Veterinary Medicine*

## ADMINISTRATIVE OFFICERS

A. A. Price, B.S., D.V.M., M.S. ....	Dean
F. D. Maurer, B.S., D.V.M., Ph.D. ....	Associate Dean
E. D. McMurry, D.V.M. ....	Assistant Dean

## GENERAL STATEMENT

The College of Veterinary Medicine is organized with seven departments. They are Anatomy, Medicine and Surgery, Microbiology, Parasitology, Pathology, Physiology and Pharmacology, and Public Health. Each department is administered by the Head of the Department, who is responsible to the Dean of Veterinary Medicine for all programs assigned or developed in the department, including teaching, research, extension and service.

A Veterinary Hospital and Ambulatory Clinics are operated within the college to provide clinical laboratories for the veterinary training program.

An extensive research program in animal health and disease is carried on by the faculty and staff of the college, and a large portion of the teaching faculty is engaged in research.

A veterinary extension program carries research information to the veterinarians, animal owners, and other people of the state and nation with the least possible delay. The faculty makes research information available to the students in the classroom and laboratories many years before the data can appear in textbook form.

The three-phase program of teaching, research, and service provides the organization necessary to cope with the dynamics of veterinary medicine in all its implications.

## CURRICULA

### **Pre-Veterinary Medicine (pre-professional)**

The curriculum in pre-veterinary medicine is designed to provide the student who plans to pursue the professional course of study with a broad and liberal academic training at the pre-professional level and, at the same time, prepare the student for the rigorous demands of the technical content of the professional curriculum. In order to accomplish such a dual objective in the two-year period allocated to the pre-veterinary curriculum, the curriculum is an intense one. It includes sound and intensive training in the social and political sciences and humanities, since there is little space in the professional curriculum for these subjects. It is strong in the physical and life sciences, since these are the cornerstones on which the professional curriculum is built. It includes comprehensive acquaintance courses in the field of animal science for those students not having had extensive experience with farm and ranch livestock.

One objective is to initiate social development so that the individual may find pleasure in his environment and make constructive contributions to the society in which he lives. The other objective is to provide the basic foundation on which the individual may build a technical career in the arts and sciences of animal health and disease. Both objectives seek to stimulate the development of the whole man.

### **Veterinary Medicine (professional)**

The professional curriculum seeks to deliver to the veterinary medical profession a student fully equipped to begin a medical career in the arts and sciences of animal health and disease. Emphasis on professional specialization is reserved for the graduate program.

Veterinary medicine encompasses the full scope of the technology of animal health and disease, including the sciences and arts of disease prevention, diagnosis, prognosis, and therapy. The professional curriculum begins at the basic level and systematically moves to the applied.

Graduates are qualified to formulate and implement programs for disease control and prevention in domestic farm animals, poultry, pet animals, zoo animals, fur-bearing animals, experimental laboratory animals, and wild life. They are equipped to administer and advise in the public health problems arising from intertransmission of dis-

eases between man and lower animals. They are prepared for inspection work in milk and meat hygiene and in food processing plants. They are capable of performing animal disease regulatory duties for governmental agencies. They are oriented for professional careers in the armed forces. They are prepared to begin careers in teaching and research in America's colleges and universities.

The degree of Doctor of Veterinary Medicine is awarded to the student upon successful completion of the professional curriculum in veterinary medicine.

The graduate has a wide choice of fields within the veterinary professional framework in which to begin his specialization with full confidence that he has received the training necessary for success.

### Graduate Program (specialization)

Graduate programs leading to the Master of Science and Doctor of Philosophy degrees are available in the departments of the College of Veterinary Medicine. These programs are designed to give effective training in the areas of professional specialization. The programs are research oriented but sufficiently flexible to permit intensive training in many areas of special interest.

### PRE-PROFESSIONAL SCHOLASTIC REQUIREMENTS

The minimum scholastic requirement for enrollment in the professional veterinary curriculum is the satisfactory completion of not less than 68 semester hours of acceptable college or university credit to include the following courses:

- Biology—6 hours (to include botany and zoology)
- Chemistry—16 hours (including at least 5 hours of organic chemistry)
- English—10 hours
- \*Government—6 hours (American and Texas)
- \*History—6 hours (American)
- Mathematics—6 hours (college algebra and trigonometry or higher)
- Physics—8 hours
- Electives—10 hours

Elective hours should be taken in the following areas, depending upon the needs of the individual student, and must have the approval of the student's academic dean: agronomy, animal sciences, biology, economics, English, foreign language, mathematics, psychology, ROTC, sociology, and statistics.

### Curriculum in PRE-VETERINARY MEDICINE

The pre-veterinary curriculum at Texas A&M University is listed below. Students expecting to qualify for enrollment in the professional curriculum in the minimum time of four semesters should pursue essentially the same pattern of courses. Substitution for any course may be made only with the approval of the Dean of Veterinary Medicine.

The curriculum in pre-veterinary medicine is a two-year non-degree curriculum. Admission to the pre-veterinary curriculum does not carry assurance that the student will be admitted to the professional curriculum. Students of junior classification or above seeking to complete pre-veterinary medicine requirements at Texas A&M University should confer with the Dean of Veterinary Medicine.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 Gen. Botany of Seed Plants	3	Biol. 107 Vertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	17		17

\*State legal requirements in government and history are required for a degree. Any student unable to complete the government requirement in the institution he is attending should consult the Registrar of Texas A&M University about the conditions under which the needed course may be obtained.

## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Chem. 227 Organic Chemistry	4	Chem. 228 Organic Chemistry	4
Engl. 203 Intr. to Literature	3	Engl. 210 Argumentation	3
Govt. 206 American National Govt.	3	Phys. 202 College Physics	4
Phys. 201 College Physics	4	M.S. or A.S.	1
M.S. or A.S.	1	Elective	4
Elective	3	P.E. 202	R
P.E. 201	R		16
	18		

## ADMISSION TO THE PROFESSIONAL CURRICULUM

Admission to the professional curriculum in veterinary medicine is granted only for the beginning of the fall trimester. Formal application must be filed with the Director of Admissions and Registrar between March 1 and May 1 of the calendar year in which admission is sought. Accompanying the application form must be two complete and official transcripts from each college or university the applicant has attended, including a record of courses in progress.

## ENROLLMENT POLICIES IN THE PROFESSIONAL CURRICULUM

Enrollment in the first year of the professional veterinary medical curriculum is limited by facilities of the College of Veterinary Medicine to a definite number each year. Because of limited enrollment in the professional curriculum, priority groups for consideration of applications are established by state and foreign country residence as follows:

1. First consideration is given to qualified applicants who are residents of Texas, states with which Texas A&M University has contracts through the Southern Regional Education Board, up to the limits of the student quotas set forth in the contracts, and foreign countries with which Texas A&M University has interinstitutional contracts, but not exceeding three entering foreign students per year.

All students admitted within this priority group and within the quotas indicated above, must qualify within the total quota of enrollees on the basis of scholastic record, professional aptitude, and character considerations.

2. If the quota is not filled from priority group 1, a second group of qualified applicants from other states of the United States which have no college of veterinary medicine and from foreign countries will be considered on the same basis as priority group 1.
3. If the quota is not filled from priority groups 1 and 2, a third group of qualified applicants from other states of the United States which have colleges of veterinary medicine will be considered on the same basis as priority group 1.

An exceptionally well qualified student will be considered without regard to residency.

## BACHELOR OF SCIENCE IN VETERINARY SCIENCE

A student enrolled in the professional veterinary medical curriculum during the Spring Semester of 1964 or thereafter, may qualify for the degree of Bachelor of Science in Veterinary Science upon satisfactory completion of the pre-veterinary requirements and the first four regular trimesters of required courses in the professional curriculum in veterinary medicine provided the student has not received a bachelor's degree subsequent to initial enrollment in the professional veterinary medical curriculum.

## ADMISSION TO THE THIRD YEAR OF THE PROFESSIONAL VETERINARY CURRICULUM

No student will be permitted to register for the last year of the professional veterinary curriculum until he has completed with an average grade of C or better, all work prescribed in the first six trimesters of the professional curriculum, and has satisfactorily completed a comprehensive examination covering all work taken during the first six trimesters. The comprehensive examination is given after the close of the third trimester of the second year, is interdepartmental in scope, and may be oral, written, or any combination of these. A student must have a passing grade in all courses through the first six trimesters and an average grade of C or better to be eligible to take this examination.



## READMISSION

A student in the professional curriculum who voluntarily withdraws from the University, or who is dropped from the rolls of the University or from the professional veterinary curriculum for cause, forfeits his standing and must apply for readmission and be approved before being re-enrolled. A student who fails any course prescribed in the professional curriculum may be dropped from the curriculum for cause.

## TRIMESTER PROGRAM IN VETERINARY MEDICINE

The trimester system includes three terms of fifteen weeks each during an academic year. The professional veterinary curriculum includes three years, or nine trimesters, of college work.

The first trimester will begin early in September and extend until the beginning of the Christmas recess. The second trimester, beginning early in January, will extend until some date in April. After a spring recess of one week, the third trimester will begin and extend until an early date in August. This plan will permit a summer vacation of four weeks following the close of the third trimester as well as the usual Thanksgiving, Christmas, Easter, and Fourth of July holiday periods.

Curriculum in  
VETERINARY MEDICINE

For classes entering the professional curriculum  
in September 1964 and thereafter

## FIRST YEAR

First Trimester		Credit	Second Trimester		Credit
B.N. 312	Vet. Physiol. Chem.	5	Ento. 208	Vet. Entomology	3
Gen. 301	Genetics	4	V.A. 302	Anatomy	4
V.A. 301	Anatomy	4	V.A. 304	Embryology	4
V.A. 303	Histology	4	V.Mi. 335	Microbiology	5
V.M.S. 311	Hist. of Vet. Profession	1	V.P.P. 326	Physiology	4
		18			20

Third Trimester		Credit
V.A. 406	Neuroanatomy	2
V.Mi. 436	Microbiology	5
V.Par. 483	Parasitology	3
V.Pat. 443	Gen. Pathology	5
V.P.P. 427	Physiology	4
		19

## SECOND YEAR

First Trimester		Credit	Second Trimester		Credit
V.M.S. 412	Radiology	2	V.M.S. 570	Gen. Surgery	3
V.Mi. 438	Virol. & Serology	3	V.M.S. 571	Dis. of Small Animals	5
V.Par. 484	Parasitology	3	V.M.S. 572	Clinical Medicine	1
V.Pat. 444	Special Pathology	5	V.M.S. 573	Obstet. & Reprod. Diseases	4
V.P.P. 429	Endocrinology	3	V.Pat. 548	Nut. & Metabolic Diseases	3
V.P.P. 430	Pharmacology	4	V.P.P. 529	Pharmacology	4
		20			20

Third Trimester		Credit
V.A. 501	Applied Anatomy	3
V.M.S. 574	Diseases of Large Animals	5
V.M.S. 575	Operative Surgery	3
V.M.S. 576	Clinical Medicine	1
V.P.P. 530	Toxicology	4
V.P.H. 590	Food Hygiene	3
		19

THIRD YEAR

First Trimester		Credit	Second Trimester		Credit
V.C. 501	Clinics	9	An.Sc. 320	Animal Nut. & Feeding	3
V.M.S. 577	Diseases of Large Animals	3	V.C. 502	Clinics	9
V.M.S. 579	Practice Mgmt.	2	V.M.S. 578	Lab. & Domestic An. Health Mgmt.	4
V.Mi. 595	Poultry Diseases	2	V.M.S. 581	Clinical Seminar	1
V.Pat. 549	Clinical Pathology	2	V.P.H. 594	Prin. of Epidemiology	3
V.P.H. 591	Food Hygiene	2			—
		20			20

Third Trimester		Credit
Mgmt. 452	Vet. Jurisprudence	3
Spch. 403	Public Speaking	3
V.C. 503	Clinics	10
V.M.S. 582	Clinical Seminar	1
V.P.H. 595	Public Health	3
		20

*Texas Maritime Academy*

President, Texas A&M University.....Earl Rudder, B.S., LL.D.

Superintendent.....Bennett M. Dodson  
Master Mariner, Captain U. S. Navy (Retired), B.S.

## Board of Visitors

A 15-man Board of Visitors has been appointed by the Board of Directors of the Texas A&M University System to advise the President of Texas A&M University in matters concerning the Texas Maritime Academy. The members are prominent citizens from widely scattered areas of Texas with a large sprinkling of men distinguished in shipbuilding, steamship operations, port operations, and international commerce.

Rear Admiral Sherman B. Wetmore, USNR (Retired), Chairman.....Galveston  
Ship Pilot and Community Leader

Captain Charles H. Glenwright, Vice Chairman.....Port Arthur  
Marine Manager

John A. Parker, Secretary.....Galveston  
Insurance Executive

C. Eugene De Fries.....Houston  
Marine Engineers Beneficial Association

Captain John T. Everett, USMS, Maritime Administration.....Washington, D. C.  
Supervisor, State Maritime Academies

William J. Graff.....College Station  
Dean of Academic Administration, Texas A&M University

Captain Thurman M. Gupton, USNR.....West Columbia  
Eighth Naval District Representative: District Judge

Captain Ernest Hendrix.....New Orleans  
Steamship Company Executive

Captain Robert L. Jones.....Galveston  
President, Master Mates and Pilots Local

Emmett O. Kirkham.....Galveston  
Shipyard Executive

Judge Peter J. La Valle.....Texas City  
County Judge

Sam D. W. Low.....Houston  
U. S. Collector of Customs

J. C. Rudd.....Orange  
Marine Sales Manager

Captain Neal S. Storter .....Brownsville  
Steamship Company Executive

Captain Wesley A. Walls.....Corpus Christi  
Marine Surveyor

# THE TEXAS MARITIME ACADEMY

The Texas Maritime Academy was established in 1962 and is an integral part of Texas A&M University. It offers an opportunity for the high school graduate or college freshman to qualify as an officer in the U. S. Merchant Marine; earn a commission as Ensign, United States Naval Reserve, Inactive; earn a Bachelor of Science degree in Marine Engineering or in Marine Transportation.



## COURSES OF STUDY

Two courses of study are offered—Marine Engineering and Marine Transportation. Each course consists of four years of college and professional education. Upon successful completion of the prescribed course of study and three sea training cruises, and upon passing the United States Coast Guard license examination for Third Mate or Third Assistant Engineer, the graduate will receive a Bachelor of Science degree from Texas A&M University in Marine Engineering or in Marine Transportation.

## ACADEMIC PROGRAM

The school year consists of two semesters in fall and spring for four years and three summer training cruises. The cruises are aboard the training ship Texas Clipper, a former passenger-cargo liner of 15,000 tons and 16 knots. Cruises are of about ten weeks duration and include visits to ports in Europe, the Mediterranean, South America, and the Pacific. Each year the cruise is scheduled to different parts of the world. Classes are conducted aboard ship and each student performs duties which supplement theoretical studies ashore.

Classes for the freshman year are conducted at Texas A&M University campus at College Station. The last three years are spent at the Texas Maritime Academy campus at Galveston on the shores of the Gulf of Mexico. Classrooms and dormitories are modern and air-conditioned.

## CAREER OPPORTUNITIES

Career opportunities in this profession for well-educated and experienced young men are unlimited. A Third Officer may earn more than \$8,000 per year. A Chief Engineer or Master may earn \$15,000 and up a year. Past graduates of maritime academies are now in positions of president, vice president, or other key positions in steamship lines, ocean terminals, shipyards, international transportation agencies and are administrators in all branches of the maritime industry both at home and abroad.

## ADMISSION

In addition to meeting the general admission requirements for Texas A&M University as outlined on page 8, the applicant must be a United States citizen, physically fit, at least 17 years of age but less than 22 years of age on admission date, and unmarried and must agree to remain unmarried while enrolled.

## ADMISSION OF TRANSFER STUDENTS

Transfer students who have satisfactorily completed two semesters of freshman college courses may be accepted for admission in June. If acceptable, the student will be eligible to participate in the summer training cruise. Applicants who have completed one semester of college may be considered for admission in February. (See Admission of Transfer Students on page 10.)

## EXPENSES

Fees and expenses for the eleven-month program average about \$1,225 annually for Texas residents and \$1,640 for nonresidents. Included in these fees and expenses are: tuition, student services, student activities, property deposit, room rent, room deposit, board plus tax, laundry (limited), textbooks and supplies, laboratory fees, uniforms, medical care and summer cruise. Incidentals are not included.

## TEXAS MARITIME ACADEMY BROCHURE

The Texas Maritime Academy publishes a brochure containing additional information. For this brochure and additional information, write to the Superintendent, Texas Maritime Academy, Texas A&M University, College Station, Texas. Interested students are welcome to visit the Texas Maritime Academy campus, 50th and Avenue U., Galveston, Texas.

### Curriculum in MARINE ENGINEERING

The Marine Engineering program leads to the degree of Bachelor of Science in Marine Engineering and to the U. S. Coast Guard issued license as Third Assistant Engineer, Steam and Motor Vessels, Ocean, Unlimited. Marine Engineering, which is

closely related to mechanical engineering, emphasizes the design, operations and maintenance of maritime power plants and associated equipment. Thorough preparation in mathematics, the sciences, and basic and applied engineering subjects is fundamental and necessary.

Engineering theory and practice are coordinated by relating classroom study to the student's practical experience aboard ship.

## FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
E.G. 105 Engr. Graphics	2	E.G. 106 Descriptive Geometry	2
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Mar.T. 101 Maritime Problems	1	Mar.E. 102 Maritime Problems	1
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
P.E. 101	R	P.E. 102	R
	16		16

## SOPHOMORE YEAR

## SUMMER SESSION I

(Ten weeks at sea in T/S Texas Clipper)

Mar.E. 200 Basic Operations	4		
Mar.E. 203 Engineering Laboratory	2		
	6		
Engl. 203 Intr. to Literature	3	Econ. 203 Prin. of Economics	3
Mar.E. 201 Mar. Engr. Mechanics	3	Math. 122 Calculus	4
Math. 121 Anal. Geom. & Calculus	4	N.S. 110 Orientation & Sea Power	1
N.S. 109 Orientation & Sea Power	1	N.S. 210 Naval Weapons	3
N.S. 209 Sea Power	3	N.S. 311 Navigation	3
Phys. 218 Mechanics & Heat	4	Phys. 219 Sound, Light, Electricity	4
P.E. 201	R	P.E. 202	R
	18		18

## JUNIOR YEAR

## SUMMER SESSION II

(Ten weeks at sea in T/S Texas Clipper)

H.E. 216 First Aid	1		
Mar.E. 204 Engineering Laboratory	2		
Mar.E. 300 Intermediate Operations	4		
	7		
Govt. 206 American National Govt.	3	Mar.E. 304 Marine Thermodynamics	3
Mar.E. 303 Marine Thermodynamics	3	Mar.E. 305 Strength of Materials	3
Mar.E. 307 Electrical Circuits	4	Mar.E. 308 Electrical Machinery	4
Math. 307 Calculus	3	Mar.E. 401 Nuclear Propulsion I	3
Naut. 201 Naval Architecture I	3	Math. 308 Differential Equations	3
	16	Naut. 202 Naval Architecture II	2
			18

## SENIOR YEAR

## SUMMER SESSION III

(Ten weeks at sea in T/S Texas Clipper)

Mar.E. 302 Engineering Laboratory	1		
Mar.E. 400 Advanced Operations	4		
Mar.E. 406 Engineering Repairs	2		
	7		
Econ. 318 Economics of Labor	3	Mar.E. 306 Mar. Refrig. & Air Cond.	3
Mar.E. 301 Fluid Mech. & Heat Trans.	3	Mar.E. 402 Diesel Engineering	3
Mar.E. 405 Steam Generators	3	Mar.E. 403 Marine Steam & Gas Turbine	3
Mar.E. 408 Nuclear Propulsion II	3	Mar.E. 414 Ship Automation	4
N.S. 310 Naval Operations	3	Mar.E. 415 Nuclear Propulsion III	3
N.S. 410 Prin. of Leadership	3		
	18		16

## Curriculum in MARINE TRANSPORTATION

The department provides a basic program for deck officer candidates. This program will have a major in the field of Marine Transportation. It is designed to combine the humanities and sciences with maritime subjects to achieve a well-rounded college curriculum which will fully equip a young man to meet the present and future needs of the maritime industry afloat and ashore.

Theory and practice are integrated by relating the scholastic efforts of the academic year to those of the sea training periods in the training ship.

The student who successfully completes the courses required by this curriculum, and after passing the required U. S. Coast Guard examination, receives the degree in Bachelor of Science in Marine Transportation and a federal license as Third Mate in the Merchant Marine.

### FRESHMAN YEAR

First Semester		Credit	Second Semester		Credit
Chem. 101	Gen. Chemistry	4	Engl. 104	Composition & Rhetoric	3
E.G. 105	Engr. Graphics	2	Geog. 201	World Regional Geog.	3
Engl. 103	Composition & Rhetoric	3	Hist. 106	Hist. of United States	3
Hist. 105	Hist. of United States	3	Mgmt. 105	Intr. to Business	3
Mar.T. 101	Maritime Problems	1	Mar.E. 102	Maritime Problems	1
Math. 102	Algebra	3	Math. 103	Plane Trigonometry	3
P.E. 101		R	P.E. 102		R
		<u>16</u>			<u>16</u>

### SOPHOMORE YEAR

#### SUMMER SESSION I

(Ten weeks at sea in T/S Texas Clipper)

Naut. 200	Basic Commun., Nav., & Seaman.	4			
Naut. 203	Seamanship I	3			
		<u>7</u>			
Engl. 203	Intr. to Literature	3	Econ. 203	Prin. of Economics	3
Math. 106	Spherical Trigonometry	3	M.L. 106	Beginning Spanish	3
M.L. 105	Beginning Spanish	3	Naut. 303	Celestial Navigation	3
Naut. 204	Terrestrial Navigation	3	N.S. 110	Orientation and Sea Power	1
N.S. 109	Orientation & Sea Power	1	N.S. 210	Naval Weapons	3
N.S. 209	Sea Power	3	Phys. 211	Brief Survey of Physics	4
P.E. 201		R	P.E. 202		R
		<u>16</u>			<u>17</u>

### JUNIOR YEAR

(Ten weeks at sea in T/S Texas Clipper)

H.E. 216	First Aid	1			
Naut. 300	Interm. Commun., Nav., & Seaman.	4			
Naut. 301	Seamanship II	3			
		<u>8</u>			
Govt. 206	American National Govt.	3	Engl. 301	Writing for Professional Men	3
Mar.T. 301	Ocean Transportation I	4	Hist. 318	Intern. Dev. Since 1918	3
M.L. 206	Intermediate Spanish	3	M.L. 206	Intermediate Spanish	3
Naut. 201	Naval Architecture	3	Naut. 202	Naval Architecture II	2
Naut. 302	Seamanship III	2	Naut. 304	Electronic Navigation	3
N.S. 309	Naval Machinery	3	N.S. 310	Naval Operations	3
		<u>18</u>			<u>17</u>

### SENIOR YEAR

#### SUMMER SESSION III

(Ten weeks at sea in T/S Texas Clipper)

Naut. 400	Adv. Commun., & Seamanship	4			
Naut. 401	Seamanship IV	3			
		<u>7</u>			



First Semester		Second Semester	
Econ. 318	Economics of Labor	Econ. 321	Intern. Trade & Finance
Mar.T. 302	Marine Cargo Oper. I	Mar.T. 402	Ocean Transportation III
Mar.T. 304	Ocean Transportation II	Mar.T. 406	Marine Cargo Oper. II
Met. 302	Weather Rep. & Forecasting	Naut. 404	The Navigator
N.S. 410	Prin. of Leadership	Ocn. 403	Tides, Waves, Currents, Ice
	Credit		Credit
	3		3
	3		4
	3		3
	3		3
	3		3
	<u>3</u>		<u>3</u>
	15		16

# *The Graduate College*

## ADMINISTRATIVE OFFICERS

W. C. Hall, B.S., M.S., Ph.D. ....	Dean
R. W. Barzak, B.A., M.A., Ph.D. ....	Associate Dean
H. M. Monroe, Jr., B.A., M.A., Ph.D. ....	Assistant Dean

## GENERAL STATEMENT

The principal objective of the Graduate College is to offer education beyond the baccalaureate level to those men and women who aspire to become intellectual leaders in various professions and in various fields of teaching and research.

## ADMISSION

A formal application is required of all persons seeking admission to the Graduate College. The application forms, which are available at the office of the Director of Admissions, should be filed not later than four weeks prior to the opening of the semester. Admission to the Graduate College cannot be granted until all the credentials enumerated in the application form have been filed.

All communications relating to admission should be addressed to the Director of Admissions. Questions on other matters concerned with graduate work should be addressed to the Dean of the Graduate College or to the appropriate subject matter department.

## GRADUATE DEGREES

Graduate courses of study are offered leading to the following degrees:

Master of Agriculture (M.Agr.)

Master of Architecture (M.Arch.)

Master of Arts (M.A.)

Master of Business Administration (M.B.A.)

Master of Computing Sciences (M.C.S.)

Master of Education (M.Ed.)

Master of Engineering (M.Eng.)

Master of Science (M.S.)

Doctor of Education (D.Ed.) (in Industrial Education only)

Doctor of Philosophy (Ph.D.)

## GRADUATE COLLEGE BULLETIN

There is published annually as a bulletin of the University an announcement of the work of the Graduate College, in which will be found full information concerning conditions of admission and requirements for degrees, including residence, thesis, and examinations. A copy of this bulletin is available upon request at the Office of the Director of Admissions.

## COURSES OF INSTRUCTION BY DEPARTMENTS

All courses offered in the University are described on the following pages and are listed by departments, arranged alphabetically.

The course numbering scheme is as follows:

- 101 to 199, courses primarily open to freshmen.
- 201 to 299, courses primarily open to sophomores.
- 301 to 399, courses primarily open to juniors.
- 401 to 599, courses primarily open to seniors.
- 601 to 699, courses primarily open to graduates.

Figures in parentheses following the number of the courses indicate the clock hours per week devoted to theory and practice respectively. Theory includes recitations and lectures; practice includes work done in the laboratory, shop, drawing room, or field. The unit of credit is the semester hour, which involves one hour of theory, or from two to four hours of practice per week for one semester of eighteen weeks.

Roman numerals to the right of the credit value of each course indicate the semester in which it is regularly offered. The letter "S" denotes summer offerings.

Any course may be withdrawn from the session offerings in case the number of registrations is too small to justify the offering of the course.

### Department of Accounting

Associate Professors Ledbetter, Manning, Packerham (Acting Head);  
Assistant Professors Lowe, Oliver, Porter

#### 227. Principles of Accounting. (3-3). Credit 4. I, II, S

Analysis and recording of business transactions; use of journal and ledger; accounting statements; payroll records and payroll taxes; introduction to partnership accounting; special journals and ledgers; voucher system.

#### 228. Principles of Accounting. (3-3). Credit 4. I, II, S

Continuation of Acct. 227. Internal control; partnership and corporation accounting; accounting for manufacturing concerns; analysis and interpretation of statements. Prerequisite: Acct. 227.

#### 327. Intermediate Accounting. (2-3). Credit 3. I, S

Working papers and preparation of statements; correction of books and statements; special phases of corporation accounting; cash and receivables; inventories, investments. Prerequisite: Acct. 228.

#### 328. Intermediate Accounting. (2-3). Credit 3. II, S

Investments; tangible and intangible fixed assets; liabilities; reserves; statement analysis; business combinations, reorganizations; price-level impact on financial statements.

#### 329. Elementary Cost Accounting. (3-0). Credit 3. I, II, S

Cost accounting principles relating to material, labor, and manufacturing expenses; cost accounting practices and procedures; process cost accounting. Prerequisite: Acct. 228.

#### 330. Advanced Accounting. (3-0). Credit 3. I, S

Special phases of partnership accounting; joint ventures; consignments; installment sales; statements of insolvent concerns; home office and branch accounting. Prerequisite: Acct. 238 or registration therein.

#### 331. Advanced Accounting. (3-0). Credit 3. II

Accounting for business combinations, consolidated statements, estates and trusts, governmental units, and foreign exchange. Prerequisite: Acct. 330.

#### 332. Cost Accounting. (3-0). Credit 3. II, S

Advanced process cost procedures, costing of joint and by-products, estimated cost, standard costs, reports and analysis for cost control, direct costing, break-even analysis. Prerequisite: Acct. 329.



**335. Administrative Accounting. (3-0). Credit 3. I, II, S**

Use of budgets; analysis and interpretation of accounting reports; cost control, and methods of measuring performance. Not open to students majoring in accounting. Prerequisite: Acct. 228.

**403. Income Tax. (3-0). Credit 3. I, II**

Income tax legislation; present income tax law and regulations; treasury decisions, court decisions, and departmental rulings; income tax problems and returns. Prerequisite: Acct. 327.

**405. Income Tax. (3-0). Credit 3. II**

Regulations applicable to partnerships, corporations, estates and trusts together with gift and inheritance taxes. Professional tax reporter services included. Prerequisite: Acct. 403.

**406. Managerial Accounting. (3-0). Credit 3. II**

Uses of accounting information by management; emphasis on accounting procedures and reports essential to management. Cost analysis, cost control, budgeting and controllership. Prerequisite: Acct. 329.

**407. Auditing. (3-0). Credit 3. I, S**

Auditing procedures used by internal auditors and independent public accountants; preparation of working papers. Prerequisites: Acct. 328, 329.

**408. Auditing. (3-0). Credit 3. II**

Continuation of Acct. 407. Preparation of working papers and audit report; case studies involving auditing problems in special situations. Prerequisite: Acct. 407.

**409. Survey of Accounting Principles. (3-0). Credit 3. I, II, S**

Survey of accounting designed for students majoring in engineering and architecture. Accounting procedures, basic cost accounting; preparation and interpretation of financial statements. Not open to students in business administration, agricultural administration, or liberal arts. Prerequisite: Junior classification.

**416. Oil Production Accounting. (3-0). Credit 3. II**

Systems and procedures for development of oil properties, and production of crude oil; intangible development costs, depletion allowance, and oil pipe line operations. Prerequisite: Acct. 228.

**419. Legal Principles Relating to Accounting. (3-0). Credit 3. I, S**

Intensive study of legal principles emphasizing those which arise in practice of accounting. Prerequisite: Senior classification.

**430. Cost Accounting Survey. (3-0). Credit 3. II, S**

Introductory cost accounting course for architects, engineers, and agricultural students. Bidding on contracts; cost procedures; process costs and budgets; cost reports. Prerequisite: Acct. 409.

**485. Problems. Credit 1 to 3 each semester. I, II, S**

Directed study on selected problems in the area of accounting not covered in other courses.

**FOR GRADUATES****601. Statement Analysis. (3-0). Credit 3. II, S**

An analytical study of different kinds of statements for guidance of executives, investors, and creditors; balance sheet and profit and loss ratios. Prerequisite: Acct. 330.

**602. Consolidated Statements. (3-0). Credit 3. II**

Consolidated balance sheets, consolidated income and surplus statements, holding companies, mergers. Prerequisite: Acct. 330.

**605. Accounting Problems. (3-0). Credit 3. I**

Advanced accounting theory and problems dealing primarily with corporation accounting, assets and liabilities, analysis of statements, and cost accounting. Prerequisite: Approval of instructor.

**606. Accounting Problems. (3-0). Credit 3. II**

Continuation of Acct. 605. Topics will deal primarily with partnerships, fiduciaries, home office and branch, insurance, and auditing. Prerequisite: Approval of instructor.

**612. Advanced Taxes. (2-0). Credit 2. II**

Study of special income tax problems of taxpayers; Federal estate and gift taxes; Texas inheritance tax; Texas franchise tax on corporations; claims for refund of taxes. Prerequisite: Acct. 403.

**616. Governmental and Institutional Accounting. (3-0). Credit 3. I, S**

Study of accounting principles and procedures peculiar to governmental units and institutions. Prerequisite: Acct. 328; Econ. 412 recommended.

**640. Accounting Concepts and Procedures. (3-0). Credit 3. I, S**

Accounting concepts and relationships essential to administrative decisions; use of accounting statements and reports as policy-making and policy-execution tools. Prerequisites: Graduate classification; approval of graduate advisor.

**669. Accounting Theory. (3-0). Credit 3. II, S**

Appraisal of concepts and standards underlying accounting procedures. Includes developments and trends in theory. Prerequisites: Graduate classification in business administration; approval of graduate advisor.

**678. Management Accounting. (3-0). Credit 3. I, S**

Problems, cases, and readings; use of accounting data in planning business operations and policies. Prerequisites: Graduate classification in business administration; approval of graduate advisor.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Critical examination of subject matter presented in current periodicals, recent monographs and bulletins in field of accounting.

**685. Problems. Credit 1 to 3 each semester. I, II, S**

Directed study on selected problems using recent developments in business research methods. Prerequisites: Graduate classification; approval of instructor.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis.

## Department of Aerospace Engineering

Professors Cronk (Head), Gilruth, Samson; Associate Professors Lowy, Rodenberger, Stricklin, Thomas; Assistant Professors Ledbetter, Lowery, Sweet, Tidwell

**201. Introduction to Aerospace Engineering. (3-3). Credit 4. I, II**

Basic aerodynamic phenomena and simplified theory; elementary aerospace vehicle performance. Prerequisites: Math. 122 or 210 or registration therein; M.E. 212 or registration therein; Phys. 219 or registration therein.

**301. Theoretical Aerodynamics. (3-3). Credit 4. I**

Fluid statics, kinematics, energy, momentum, similarity, viscosity, boundary layer, drag circulation, lift, potential flow, thin airfoil theory, high lift devices. Prerequisites: Aero. 201; Math. 308.

**303. High Speed Aerodynamics. (3-3). Credit 4. II**

Airfoil section characteristics and critical Mach Number. Span loading, fundamentals of compressible flow, pressure coefficients, critical conditions, aerodynamic heating, shock waves, compressibility effects, sweep back, and high speed data. Prerequisites: Aero. 301; M.E. 323.

**304. Elementary Aerospace Structures. (3-0). Credit 3. I**

Aerospace vehicle load analysis, external and internal loads and reactions for trusses, beams, and space frameworks. Prerequisite: C.E. 305.

**306. Strength of Aerospace Materials. (2-3). Credit 3. II**

Mechanical properties of materials and their use in design of members subject to tension, compression, shear, and bending. Combined stresses and margins of safety. Prerequisite: Aero. 304.

**312. Materials Science. (2-3). Credit 3. I, II**

Fundamental course in engineering applications of materials science. Theory plus laboratory practice in structure of solid materials; dislocation theory; strength; failure; creep; fatigue. Prerequisite: Phys. 220.

**316. Aerospace Propulsion I. (3-0). Credit 3. II**

Introduction to aerospace propulsion systems; cycle analysis; performance of turbo-jet, ram jet, pulse jet, and rocket power plants. Prerequisite: M.E. 323.

**320. Numerical Methods. (2-3). Credit 3. I, II**

Digital computers; Fortran; approximations; curve fitting; computer techniques of differentiation, integration, interpolation, and extrapolation; numerical solutions of algebraic and differential equations. Prerequisite: Math. 308 or registration therein.

**401. Aerospace Vehicle Design. (2-6). Credit 4. II**

Aerodynamic design, specification, arrangement, performance analysis, weight and balance, stability. Prerequisite: Senior classification.

**405. Aerospace Structures. (3-0). Credit 3. I**

Analysis of thin sheet metal structures, including shells, beams, and compression members subjected to critical loads. Prerequisite: Aero. 306.

**417. Aerospace Propulsion II. (3-0). Credit 3. I**

Study of the development, fundamentals, theories, construction, design and performance of turbo-jet, ram jet, pulse jet, and rocket power plants. Prerequisite: Aero. 316.

**419. Chemical Rocket Propulsion. (3-0). Credit 3. I**

Study of nozzles and heat transfer in rockets, liquid and solid propellant systems, combustion and combustion stability, flight performance including trajectories, multi-staging and exchange rate curves, rocket testing. Prerequisite: Aero. 316.

**420. Aeroelasticity. (3-0). Credit 3. I**

Analysis of fundamental vibration phenomena with application to aerospace vehicle aeroelastic problems. Prerequisites: Math. 308; M.E. 313.

**421. Dynamics of Aerospace Vehicles. (3-0). Credit 3. II**

Linear theory of vibrations of single and multi-degree of freedom systems; self-excited vibrations. Applications of matrix algebra. Elementary theory of flutter; landing, impact, gust response, dynamic stability. Prerequisite: Senior classification.

**423. Space Technology I. (3-0). Credit 3. I**

Rocket fundamentals. Trajectories including aerodynamics, gravity turn and trajectory optimization, orbital mechanics, orbit lifetimes, three-body problem, orbit perturbations. Prerequisites: Registration in Aero. 417; Math. 308.

**431. Spacecraft Technology. (3-0). Credit 3. II**

Environmental conditions; detectors and sensing devices; methods of orienting spacecraft; power sources; telemetry systems; structural considerations; electronic components; integration of spacecraft components; fabrication techniques. Prerequisite: Senior classification.

**435. Aerothermochemistry. (3-0). Credit 3. II**

Composition of chemically reacting gases (air and propellant); thermodynamic functions based on classical and quantum mechanical theories; calculation of gas temperatures; equilibrium, frozen and non-equilibrium flows through nozzles and shock waves. Prerequisite: Aero. 303.

**472. Advanced Compressible Flow I. (3-0). Credit 3. I**

Method of characteristics. Taylor-Maccoll theory of conical flow, theory of finite wings in supersonic flight, minimum drag shapes, the method of characteristics and applications, conical flow theory, studies of effects of wing-body interference and methods of analysis. Prerequisite: Aero. 303.

**475. Aerodynamics of Viscous Fluids. (3-0). Credit 3. I**

Navier-Stokes equations, Prandtl simplification and exact solutions, Karman-Polhausen method, transition theory, turbulent flow equations, general velocity distribution laws, use of pipe flow data, Von Doenhoff-Tetervin method, introduction to compressible boundary layers and heat transfer. Prerequisite: Aero. 301.



**477. Superaerodynamics. (3-0). Credit 3. II**

Fundamental equations of molecular motion, velocity distribution function, general transfer equation and molecular transport phenomena, Knudsen number, slip flow in a pipe, free molecule flow, forces on a flat plate in free molecule flow, heat transfer effects, temperature jump, experimental devices. Prerequisite: Senior classification.

**481. Seminar. (1-0). Credit 1. I**

Readings, reports, conferences, and discussion. Prerequisite: Senior classification in aerospace engineering.

**485. Problems. Credit 1 to 4. I, II, S**

Special problems in aerospace engineering assigned to individual students or groups. Prerequisites: Senior classification; approval of Department Head.  
(See S.M. 468, 469 for description of related courses.)

**FOR GRADUATES****601. Principles of Fluid Motion. (4-0). Credit 4. I**

Mathematical methods of analysis are emphasized. Perfect fluid theory development. Treatment of viscosity and boundary layer phenomena. Prerequisite: Aero. 303.

**603. Aerodynamics of the Airplane. (4-0). Credit 4. II**

Application of vector analysis to two- and three-dimensional airfoil theory. Viscosity and compressibility. Drag of aircraft components. Static and dynamic stability criteria. Prerequisite: Aero. 303.

**604. Dynamics of Compressible Fluids. (4-0). Credit 4. I**

Properties of compressible fluids, dynamics of one-dimensional motion, channel flows, shock waves, methods of observation, extension to two- and three-dimensional flow, effects of viscosity. Prerequisite: Aero. 303 or approval of Department Head.

**606. Space Propulsion. (3-0). Credit 3. II**

Propulsion systems performance, power generation, thermal and electrical power propulsion, fundamentals of magnetohydrodynamics. Prerequisites: Aero. 601; E.E. 322; or approval of instructor.

**608. Aircraft Flutter Analysis. (4-0). Credit 4. II**

Theoretical development of the structural and aerodynamic equations for two- and three-dimensional flutter. Numerical solutions in practical problems to determine flutter velocities. Methods of testing to determine vibration characteristics of aircraft. Prerequisite: Aero. 420, or M.E. 459 or 617.

**610. Nuclear Rocket Propulsion. (3-0). Credit 3. II**

Basic rocket performance, system analysis, heat transfer and fluid flow, materials, nucleonics, system and component testing. Prerequisites: Aero. 417; N.E. 601.

**612. Space Technology II. (3-0). Credit 3. II**

Satellite launch trajectories, oblate effects and precession, lunar trajectories, interplanetary operations and orbit transfer, satellite recovery and re-entry. Prerequisite: Aero. 423.

**632. Structural Design of Missiles and Spacecraft. (3-0). Credit 3. II**

Flight loads; environment; heat transfer and thermal stresses; materials and material behavior; pressure-stabilized structures; aeroelastic effects and dynamic loads; structural fatigue; reliability. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Investigation of special topics not within the scope of thesis research and not covered by other formal courses. Prerequisite: Graduate classification in aerospace engineering.

**691. Research. Credit 2 to 6 each semester. I, II, S**

Technical research projects approved by Department Head.  
(See S.M. 601, 602, 603, 604, 605, 606, 607, 608, 609 for description of related courses.)

## Department of Agricultural Economics and Sociology

Professors Branson, McNeely, Magee, Nelson, Skrabanek, Timm (Head), Wooten; Associate Professors Davis, Edmondson, Farris, Fowler, Kincannon, Moore, Sorensen, Stelly, Wehrly; Assistant Professors Dickerson, Eddleman, Graves, Kutach, Kuvlesky, Schmedemann, Shafer, Trock, Upham, Ward, Welsh; Instructor Dickerson

### AGRICULTURAL ECONOMICS

#### 105. Introduction to Agricultural Economics. (3-0). Credit 3. I, II

Characteristics of our economic system and basic economic concepts. Survey of the farm and ranch firm and its organization and management; structure and operation of the marketing system; functional and institutional aspects of agricultural finance; government farm programs.

#### 314. Marketing Agricultural Products. (3-0). Credit 3. I, II, S

General introductory course covering the operations involved in the movement of agricultural commodities from the farmer to the consumer; including a detailed study of the essential marketing functions of buying, selling, transportation, storage, financing, standardization, pricing, and risk bearing.

#### 317. Quantitative Analysis in Agricultural Economics. (3-0). Credit 3. I

Econometric methods used to solve problems in agricultural economics relating to marginal analysis, production and consumption functions, maximization and minimization principles, elasticity, agricultural firm and market equilibrium, the cobweb model, uncertainty, and static and dynamic models. Prerequisites: Econ. 204; Math. 110; Stat. 201 or the equivalent.

#### 321. Farm and Ranch Records and Accounts. (2-2). Credit 3. I

Study of methods and systems of recording and analyzing farm and ranch operational data. Laboratory work devoted to acquiring skill in summarizing and using records as effective aids in more profitable farming and ranching. Prerequisite: Twelve hours of credit in technical agriculture.

#### 325. Principles of Farm and Ranch Management. (2-2). Credit 3. I, II, S

Economic and business principles applied to the organization of farms and ranches for more profitable operation. Laboratory work utilizes data from actual farms and ranches. Prerequisite: Twenty hours of credit in technical agriculture.

#### 413. Agricultural Cooperatives. (3-0). Credit 3. II

Historical development and principles of cooperative associations in our economic system. Organizational and operational aspects of cooperatives; legal considerations, financing, management and member relations. Future role of cooperatives. Prerequisite: Ag.Ec. 314.

#### 414. Agricultural Market Analysis. (3-0). Credit 3. I

Analytical treatment of economic problems in marketing of agricultural products. Social, physical, and economic relationships embodied in marketing processes; actions taken by agricultural firms and organized commodity groups, and the resulting influences; public policies in marketing and their influence upon market outcomes. Prerequisites: Ag.Ec. 314; Econ. 323 or approval of Department Head.

#### 416. Economics of Livestock Marketing. (2-0). Credit 2. I

Economic analysis of the livestock and meat industry; marketing practices of livestock producers; characteristics of major agencies and services; problems associated with the movement of livestock from producer to consumer. Prerequisite: Ag.Ec. 314.

#### 422. Land Economics. (3-0). Credit 3. I, II, S

Study of the economic, institutional, and physical factors involved in the utilization and control of natural resources. Prerequisite: Econ. 203.

#### 427. Cotton Marketing. (3-0). Credit 3. S

Geography of supply and demand for cotton; competition of other fibers. Cotton trade procedures and price making in local, central, spinner, and future markets; reducing price risks; cost of merchandising cotton; governmental policies and regulations. Prerequisite: Ag.Ec. 314.

**429. Agricultural Policy. (3-0). Credit 3. II**

An analysis of the causes, nature, and effects of government participation in agriculture. Emphasis is upon the interrelationship of American agriculture and the political and economic system, public administration and interest representation. Prerequisite: Econ. 203.

**430. Agricultural Finance. (3-0). Credit 3. II**

Analysis of the capital requirements for farming and ranching and how they are obtained; principles involved in the use of each type of credit necessary to sound financial management; the risk, costs, and legal aspects of credit. Prerequisite: Econ. 203.

**432. Farm and Ranch Appraisal and Organization. (2-2). Credit 3. II**

Detailed problems involved in the appraisal and organization of specific farms and ranches, covering appraisal principles, procedures, design, analysis, and reporting. Prerequisite: Ag.Ec. 422.

**443. Applied Farm Management. (2-2). Credit 3. S**

Special three-week summer course for professional agricultural workers, reviewing basic economic principles used in farm management. Not open for agricultural economics M.S. or Ph.D. majors. Prerequisites: Baccalaureate degree; experience in professional agricultural work.

**447. Agricultural Prices. (3-0). Credit 3. I**

Analysis of the factors influencing the level of agricultural commodity prices. Analysis of price trends and seasonal variation; parity prices; methods of forecasting demand and prices. Futures trading. Prerequisite: Econ. 323.

**449. Farm Management Analysis. (2-2). Credit 3. II**

Application of principles of efficient resource use provided through case studies as guide to identifying farm management problems and interpreting alternatives. Prerequisites: Ag.Ec. 325; Econ. 323; Stat. 201.

**452. International Trade and Agriculture. (3-0). Credit 3. I**

World production and demand of agricultural commodities; world trade in farm products with emphasis on causal factors; national and international policies relating to agriculture. Designed for those interested in foreign agricultural service. Prerequisite: Senior classification.

**481. Seminar. (1-0). Credit 1. I**

Role of the social scientist in the agricultural industry; professional opportunities and responsibilities; individual investigations and reports; discussions with prominent leaders in the field. Prerequisite: Senior classification in agricultural economics or approval of Department Head.

**485. Problems. Credit 1 to 3 each semester. I, II, S**

Study of special problems which are not covered by other courses. Content will depend upon problem studied. Prerequisites: Ag.Ec. 105 or Econ. 203; 3 additional hours of agricultural economics; junior classification; approval of Department Head.

**FOR GRADUATES****602. Agricultural Market Organization and Structure. (3-0). Credit 3. S**

An analysis of the framework within which farm products are marketed. Implications of horizontal and vertical integration and governmental activities. Influence of producers, the food and fiber industries, and consumers on market structure. Prerequisite: Ag.Ec. 314.

**603. Land Economics. (3-0). Credit 3. II**

Study of selected problems of the allocation and utilization of natural resources with special reference to government organizations, quasi-government bodies, and other interest groups. Prerequisite: Ag.Ec. 422 or approval of Department Head.

**607. Research Methodology. (3-0). Credit 3. I**

Scientific approach, role of theory and assumptions, bias and prejudice, attributes of problems, methods and tools of agricultural economics and sociology research. Student evaluates research studies and develops thesis prospectus or equivalent. Prerequisite: Approval of Department Head.



**611. Production Economics Static. (3-0). Credit 3. II**

Economic principles for analyzing agricultural production and resource use; problems are treated regarding the technical unit, the firm and society with emphasis on conditions for efficiency. Prerequisite: Approval of Department Head.

**613. Contemporary Thought in Agricultural Economics. (3-0). Credit 3. I**

Study of contemporary contributions to the thought and analysis of aggregate relationships and problems in the agricultural economy. Prerequisite: Approval of Department Head.

**614. Agricultural Policy. (3-0). Credit 3. S**

Analysis of public policies and programs affecting agriculture. Development of policies and programs for agriculture and their bases. Prerequisite: Ag.Ec. 429 or approval of Department Head.

**617. Economics of Consumption. (3-0). Credit 3. I**

Consumer market for agricultural products; effects of family attributes on preferences and buying habits; consumer motivations; advertising; retail price policies; and market research. Prerequisite: Approval of Department Head.

**619. Farm and Ranch Business. (2-2). Credit 3. I**

Interrelationships of factors affecting profits in farming and ranching. Organization and management of actual farm and ranch businesses. Relation of theory and practice in farming and ranching. Prerequisite: Approval of Department Head.

**620. Capital Market in Agriculture. (3-0). Credit 3. II**

Role of capital in economic growth and structure of the capital market for agriculture. Determinants of aggregate capital supply. Prerequisite: Ag.Ec. 430 or approval of Department Head.

**627. Agricultural Market and Price Analysis. (3-0). Credit 3. I**

Application of economic theory and statistical methods to the analysis of agricultural commodity price behavior. Price forecasting. Relationships among farm prices, marketing costs, and retail prices. Prerequisites: Ag.Ec. 447; B.Ana. 303.

**629. Public Administration in Agriculture. (3-0). Credit 3. S**

Study of basic theories in public administration in agriculture; techniques for accomplishing public goals; legal basis for public agriculture programs; economic, social, political, and organizational considerations in agriculture programs. Prerequisite: Approval of Department Head.

**632. Production Economics-Dynamic. (3-0). Credit 3. I**

Proceeding from static partial equilibrium analysis into dynamic theories of production economics. Study in depth of decision making process. Consideration of risk, uncertainty, farmer life cycles and goals other than profit maximizing. Exploring interdisciplinary approaches in study of decision making. Prerequisite: Ag.Ec. 611.

**633. Economics of Underdeveloped Agricultural Areas. (3-0). Credit 3. S**

Function of agriculture in economic growth. Agricultural productivity as influenced by an economy's physical, cultural, and institutional attributes. Economic problems of underdeveloped areas. Prerequisites: Econ. 330; approval of Department Head.

**641. Statistical Methods in Agricultural Economics. (2-2). Credit 3. II**

Planning statistical research project; developing forms; selecting sample; conducting study; tabulating, analyzing and interpreting the data. Prerequisites: B.Ana. 303 or Stat. 406 or equivalent; 15 hours of social science; approval of Department Head.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Review of current literature, preparation of papers on selected topics, discussions with visiting agricultural economists. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Directed individual study of a selected problem in the field of agricultural economics. Prerequisite: Approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Initiation and completion of a research project of approved scope for an advanced degree. Prerequisite: Approval of Department Head.

## SOCIOLOGY

**205. Principles of Sociology. (3-0). Credit 3. I, II, S**

Introductory survey course designed to acquaint the student with elementary principles of sociology.

**206. Social Institutions and Processes. (3-0). Credit 3. I, II**

Introduction to major sociological theories, concepts and principles relating to the complexity of modern society. Research studies in social processes, stratification, and institutions which produce social organization and disorganization.

**304. Criminology and Juvenile Delinquency. (3-0). Credit 3. I, II**

Historical and contemporary theories of criminology coupled with citation of significant research. Causes, extent, cost, ecology of crime. Police, criminal and juvenile courts, prisons, reformatories, prevention, and rehabilitation. Prerequisite: Junior classification.

**306. Principles of Social Work. (3-0). Credit 3. I, S**

Private and public welfare agencies. Techniques of interviewing, group work, case work, and social work organization. Professional employment in social work. Prerequisite: Soc. 205 or 9 hours of social science.

**310. Cultural Anthropology. (3-0). Credit 3. I**

Evolution of cultures. Differences, similarities and effects of material and non-material culture on economic, social, and political organization. Contributions of social scientists to cultural anthropology. Prerequisite: Junior classification.

**314. Social Problems. (3-0). Credit 3. I**

Social problems explored from standpoint of social, economic, political, and physical implications operating to produce the impact of social change. Solutions to major social problems. Prerequisite: Soc. 205 or approval of Department Head.

**315. The Family. (3-0). Credit 3. I, II**

The family as a social institution. Family formation, courtship, engagement, marriage, personal adjustment, financing, and child rearing are emphasized. Prerequisite: Junior classification.

**320. Social Anthropology. (3-0). Credit 3. II**

Cultural patterns in relation to social systems, institutions, customs, values, ethos, universal constants, and cultural diffusion. Implementing social, cultural, and technological changes. Adjustments of personnel to foreign cultures. Prerequisite: Soc. 205 or approval of Department Head.

**321. Urban Sociology. (3-0). Credit 3. I, II**

Sociological approach to study of urban society. Historic, modern, and comparative perspective with major emphasis on demography, ecology, social and cultural organization, social relationships, social change, and planning. Prerequisite: Junior classification.

**322. Industrial Sociology. (3-0). Credit 3. I, II**

Principles of work relations in jobs, emphasis on social relations of groups and occupations. Rise, scope, and major problems of industrial sociology. Social adjustment of the worker and social organization of work plant as integral parts of society.

**404. Community Development. (3-0). Credit 3. II**

Delineation of communities and problems associated with each particular type. Examination of strategies of change that can be applied to community development. Prerequisite: Soc. 205 or 407.

**407. Human Relations in Agriculture. (3-0). Credit 3. I, II, S**

Interpersonal, group, and institutional relationships in a changing rural environment. Human factors involved in dynamic agricultural situations. For students in agriculture. Prerequisite: Junior classification.

**411. Social Psychology. (3-0). Credit 3. I, II**

Analysis of human behavior. Effect of social experiences and groups on the development of personality. Attitudes, values, and motives. Social adjustment and maladjustment, including analysis of causes. Prerequisite: Three hours of sociology or psychology.

**412. Population Analysis. (3-0). Credit 3. II, S**

Methods of demographic analysis. Influence of demographic phenomena on social values and structure. Theories of growth and change. Prerequisites: Twelve hours of social science; approval of instructor.

**414. Social Institutions of Latin America. (3-0). Credit 3. I**

Analysis of characteristics and dynamics of contemporary Latin American populations, including rural-urban relationships and differentials. Cultures and social institutions of republics of Latin America. Current social trends and problems stressed. Prerequisites: Junior classification; approval of instructor.

**418. Public Opinion and Social Control. (3-0). Credit 3. II**

Nature and function of public opinion, social-psychological processes basic to public opinion. Opinion formation and change. Opinion measurement. Analysis of propaganda, mass media and communications, social organization and social order. Prerequisite: Soc. 205.

**430. Sociological Theory. (3-0). Credit 3. I**

Historical development of sociology as a scientific discipline. Development of general orientations, conceptual schemes, and theories that characterize modern sociology. Prerequisite: Soc 205.

**481. Seminar. (1-0). Credit 1. I**

Preparation by students of papers on role of social scientist in fields of research, organization, and management within the framework of social systems. Prerequisite: Senior classification in sociology.

**485. Problems. Credit 1 to 3 each semester. I, II, S**

Special problems not covered by other courses. Course depends upon needs and interests of the student and upon the number of credit hours. Prerequisite: Senior classification in sociology.

**FOR GRADUATES****601. Rural-Urban Relations. (3-0). Credit 3. I, S**

City growth trends and their impact upon fringe areas. Economic, commercial, residential structures and basic urban institutions. Problems and a search for the ideal city. For students in architecture, administration, education, and transportation. Prerequisite: Soc. 205 or 12 hours of social science.

**602. Contemporary Theory in Rural Sociology. (3-0). Credit 3. II**

Development of professional field of rural sociology. Theories and contributions of sociologists and social scientists to field of rural sociology. Prerequisite: Soc. 205 or 12 hours of social science.

**608. Social Organization. (3-0). Credit 3. I**

Analysis of human pluralities and groups, including nature of social cohesion and levels of communication. Consideration of structural and functional aspects of human groups from simplest informal to most complex formal types: voluntary associations, cliques, families, bureaucracies, societies. Prerequisites: Soc. 205 or equivalent; 9 additional hours of social science.

**609. Social Change. (3-0). Credit 3. I, S**

Systematic analysis of concepts, theories and processes significant to social change. Relationship of social change to universals, consistent mechanisms, regularities, and incentives. Functional approach to the process of innovations. Prerequisite: Approval of Department Head.

**610. Sociological Theory. (3-0). Credit 3. II**

Advanced study of contemporary trends in theory-development in sociology, including comparative study of general sociological frameworks and application of these systems to particular substantive areas of sociology. Prerequisite: Soc. 611.

**611. History of Social Thought. (3-0). Credit 3. I**

Social thought from ancient times to present. Evolvement of sociological theories and their contributions to modern sociology. Prerequisite: Soc. 205 or 12 hours of social science.



**612. The Community. (4-0). Credit 4. II**

Problems, processes, and techniques of community development. Effective methods through community development for improving the general well-being of community residents. Prerequisite: Twelve hours of social science.

**618. Educational Sociology. (3-0). Credit 3. II, S**

How the school system can strengthen the democratic way of life. Relationship of education to social organization, social change, and social control. Analysis of role of education in society. Prerequisite: Soc. 205 or a degree in education.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Directed individual study of selected problem in field of sociology. Prerequisite: Approval of instructor.

**691. Research. Credit 1 or more each semester. I, II, S**

Initiation and completion of research project or approved scope for an advanced degree. Prerequisite: Approval of instructor.

## Department of Agricultural Education

Professor Knebel (Head); Associate Professors Cook, Holcomb, Holt, Jaska, Webb;  
Assistant Professor Irick

**301. Introduction to Agricultural Education. (1-2). Credit 2. I**

Introduction to education in agriculture designed to acquaint students with its aims and functions. Prerequisite: Junior classification or approval of Department Head.

**425. Course Building. (1-2). Credit 2. I**

Preparing units of instruction for high school and adult education programs. Prerequisites: Ag.Ed. 301; senior classification; or approval of Department Head.

**426. Methods in Adult Agricultural Education. (2-0). Credit 2. II**

Planning educational programs for adult farm people. Developing skill in use of group processes in teaching. Prerequisite: Senior classification or approval of Department Head.

**427. Methods of Developing Farming Programs. (1-2). Credit 2. II**

Planning and supervising farming and work experience programs of students. Prerequisite: Senior classification or approval of Department Head.

**436. Student Teaching in Agricultural Education. (2-12). Credit 6. II**

Planning for and teaching vocational agriculture in selected high schools in Texas. Laboratory hours include one-half semester student teaching. Prerequisites: Senior classification; completion of the prerequisite sequence of professional courses in agricultural education.

**441. Agricultural Extension Organization and Methods. (2-2). Credit 3. I**

Study of cooperative extension in agriculture and home economics; development, objectives, organization, program building, and methods of teaching. One-week observation with a county extension agent. Prerequisite: Junior or senior classification.

**485. Problems. Credit 1 to 4. I, II, S**

Directed individual study of selected problem in field of agricultural or extension education with emphasis on collection, analysis, and presentation of information. Prerequisite: Approval of Department Head.

## FOR GRADUATES

**601. Advanced Methods in Agricultural Education. (3-0). Credit 3. I, II, S**

Advanced course in methods of teaching. Prerequisite: Professional experience or approval of Department Head.

**605. Supervised Farming. (3-0). Credit 3. I, II, S**

Advanced study of supervised farming and work experience programs. Prerequisite: Professional experience or approval of Department Head.

**607. Future Farmer and Young Farmer Activities. (3-0). Credit 3. I, II, S**

Methods of conducting Future Farmer and Young Farmer activities. Prerequisite: Professional experience or approval of Department Head.

**610. Methods in Adult and Young Farmer Education. (3-0). Credit 3. I, II, S**

Methods of determining and evaluating educational programs in agriculture. Prerequisite: Professional experience or approval of Department Head.

**613. Administration and Supervision of Agricultural Education. (3-0). Credit 3. I, S**

Problems of organization, administration, financing, and supervision of vocational agriculture and extension work. Prerequisite: Professional experience or approval of Department Head.

**615. Philosophy of Agricultural Education. (3-0). Credit 3. I, II, S**

Study of philosophy and evaluation of education in agriculture. Emphasis on development and use of evaluative criteria. Prerequisite: Professional experience or approval of Department Head.

**616. Program Building in Agricultural Education. (3-0). Credit 3. I, II, S**

Organization of educational programs in agriculture on local, state, and national basis. Prerequisite: Professional experience or approval of Department Head.

**619. Workshop in Agricultural Education. Credit 1 to 3. I, II, S**

Offered for one, two, three, or six weeks or full semester to study selected problems in agricultural or extension education. Consultants are utilized in specialized areas. Prerequisite: Professional experience or approval of Department Head.

**630. Guidance and Counseling for Rural Youth. (3-0). Credit 3. I, II, S**

Analysis of occupational and vocational opportunities for rural youth; techniques of individual group counseling in guidance. Practicum in personality and occupational interest testing. Prerequisite: Approval of Department Head.

**640. Methods of Technological Change. (3-0). Credit 3. I, II, S**

Dynamics of cultural change as theoretical framework for process of planned technological change, methods of planning and implementing change, its effects and how it can be predicted. Prerequisite: Approval of Department Head.

**681. Seminar. (1-0). Credit 1. I, II, S**

Group study and discussion of current developments in agricultural education. Special emphasis given to research and legislation as they affect programs in teacher education, vocational agriculture, and related areas of education. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Studies related to classroom, laboratory, supervised farming, work experience, extension education, and adult educational activities in agricultural programs. Prerequisite: Approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Initiation and completion of research for advanced degree. Prerequisite: Approval of Department Head.

## Department of Agricultural Engineering

Professors Hobgood (Head), McCune, Smerdon, Sorenson; Associate Professors Kunze, Wilkes; Assistant Professors Aldred, Stewart; Instructors Beerwinkle, Glass, Richardson

**101. Agricultural Engineering Problems. (2-0). Credit 2. I**

Designed to give student appreciation of basic and engineering sciences as these are used in electric power and processing, power and machinery, soil and water conservation, and agricultural structures areas of agricultural engineering.

**201. Farm Power and Machinery. (2-2). Credit 3. I, II**

Construction, operation, adjustments, and servicing of farm engines and tractors. Adaptability, selection, economic utilization, construction, operation, and adjustment of the principal tillage, planting, cultivating, harvesting, and feed processing machines.

**205. Materials in Light Structures. (2-3). Credit 3. I**

Selection and utilization of materials for light structures. Specifications and cost estimation. Prerequisite: E.G. 105.

**208. Agricultural Machinery. (2-3). Credit 3. II**

Mechanics, design, and materials of farm machinery construction. Rotary power transmission, hydraulic controls, functional requirement, principles of operation, performance characteristics, capacity, economic utilization. Analysis of tillage, planting, harvesting, and handling mechanisms. Prerequisite: Phys. 218.

**213. Food Plant Engineering. (2-3). Credit 3. II**

Elementary mechanics, power transmission, steam and steam boilers, pipes and pipe fitting, refrigeration and insulation, temperature measurement and control, electric motors, disposal of waste products, and mechanical problems as applied to foods and food processing.

**221. Farm Shop. (1-3). Credit 2. I**

A course for students in agricultural education and general agriculture involving carpentry and woodwork, tool sharpening, preparation of simple drawings and bills of materials, blueprint reading, and rafter cutting.

**222. Farm Shop. (1-3). Credit 2. I, II**

A course for students in agricultural education and general agriculture involving electric and gas welding, cold metal work, forging, soldering, pipe fitting, and the preparation and use of concrete.

**302. Environmental Engineering. (3-0). Credit 3. I**

Thermodynamic principles related to agricultural engineering processes and operations, properties of air and air-vapor mixtures, refrigeration, solar radiation and environmental requirements for plants, animals, and agricultural products. Topics concerned with environments or methods of controlling environment of engineering processes related to biological materials and/or systems. Prerequisites: Phys. 219 or equivalent; approval of instructor.

**324. Agricultural Engine and Tractor Design. (2-3). Credit 3. II**

Principles of farm tractor chassis design, traction devices, stability; hitches, power transmission, operation and design of internal combustion engines. Principles of carburetion, ignition, cooling, lubrication, hydraulic systems, and operator's comfort and convenience. Testing and rating procedures. Prerequisites: Ag.En. 302; M.E. 212; Phys. 219.

**325. Farm Electricity. (2-2). Credit 3. I, II**

Course for students in agricultural education and general agriculture covering elements of electric current generation and transmission, applications of electric heating, lighting and power, wiring, motors, power rates, meter reading, safety rules and regulations.

**335. Water Control and Utilization. (2-3). Credit 3. I, II**

Elementary surveying, including chaining, leveling, and mapping as applied to farm needs. Water control and utilization, emphasizing irrigation principles and practices, associated problems of drainage, and fundamentals of terracing and farm pond design.

**401. Environmental Design of Agricultural Structures. (2-3). Credit 3. I**

Design considerations in environmental control with major emphasis on heat flow through walls, condensation and vapor transmission, ventilation requirements and heating and cooling loads. Prerequisite: Ag.En. 302.

**410. Irrigation and Drainage Engineering. (2-3). Credit 3. II**

Engineering principles of irrigation. Water sources; measurement and distribution of water; irrigation pumps; design of surface and sprinkler irrigation systems; salinity control. Design of surface and subsurface drainage systems; drainage districts and laws. Prerequisites: Agro. 445 or registration therein; C.E. 206, 311.

**413. Agricultural Structures Design. (2-3). Credit 3. II**

Engineering principles of farm structure design; loads, reactions, and force systems; analysis and design of wood and steel beams, light frames and connections. Fundamentals of design of concrete beams, slabs, and columns as applied to agricultural building. Prerequisite: C.E. 305.



**418. Agricultural Process Engineering. (2-3). Credit 3. I**

Applications of basic engineering and biological principles to equipment, methods, and systems involved in agricultural processing activities. Covers instrumentation for process operations, flow of fluids and granular materials, fans, fan laws and fan selection, conditioning and storage of agricultural products and materials handling. Prerequisite: Ag.En. 302.

**428. Soil and Water Conservation Engineering. (2-3). Credit 3. I**

Engineering principles of soil and water conservation. Rainfall and runoff, soil erosion by water and wind; terrace and terrace outlet design; design of agricultural reservoirs and related structures. Prerequisites: C.E. 206, 311.

**430. Electricity and Electronics in Agriculture. (3-3). Credit 4. II**

Electrical and electronic fundamentals applied to agricultural production and rural living. Emphasizes circuit fundamentals, power, energy, resistance, inductance, capacitance, power factor, wiring design, motor fundamentals, selection, installation, and operation of electrical and electronic equipment for agricultural applications. Prerequisite: Phys. 219.

**481. Seminar. (1-0). Credit 1. I**

Review of current literature dealing with agricultural engineering problems presented by staff members and students. Prerequisite: Senior classification.

**482. Seminar. (1-0). Credit 1. II**

Presentation of papers dealing with new developments and results of investigations of problems related to agricultural engineering. Prerequisite: Senior classification.

**485. Problems. Credit 1 to 4. I, II, S**

Selected problems in any phase of agricultural engineering. Credit and specific content dependent upon background, interest, ability, and needs of student enrolled. Individual consultations and reports required. Prerequisites: Junior classification; approval of Department Head.

**FOR GRADUATES****601. Instrumentation and Research Methods. (3-0). Credit 3. I**

Analysis of research techniques, scientific method, and design of experiments. Theory and use of instruments for research, particularly electrical-input transducers. Dimensional analysis, theory of similitude, design of research models, and development of prediction equations. Prerequisite: Approval of instructor.

**602. Irrigation and Drainage. (3-0). Credit 3. II**

Theory and practice in irrigation and drainage. Soil moisture, moisture flow, hydraulics of wells, erosion and sedimentation of structures, and theory of water application methods. Salinity and sodicity and their control. Drainage methods and theory, steady state and non-steady state. Prerequisite: Ag.En. 410 or equivalent.

**603. Agricultural Machinery. (3-0). Credit 3. I**

Functional farm machinery design. Encompasses analysis of problem need, functional requirements, common materials used, design, testing, and production of efficient operational units. Prerequisites: Ag.En. 208; M.E. 313.

**605. Agricultural Structures. (3-0). Credit 3. I**

Structural, environmental, and economic problems encountered in agricultural buildings. Special emphasis on design, considerations for structural materials. Research methods and procedures as applied to agricultural structures. Prerequisites: Ag.En. 413, 418.

**606. Agricultural Process Engineering. (3-0). Credit 3. II**

Engineering principles involved in mechanical handling, cleaning and sorting, size reduction, conditioning, and storage of agricultural products. Includes use of refrigeration, electric energy, and radiation. Prerequisites: Ag.En. 418, 430.

**609. Farm Power. (3-0). Credit 3. II**

Theory and principles of operation as applied to internal combustion engines used for agriculture. Emphasis given to application and functional design requirements and testing procedures. Prerequisites: Ag.En. 324; M.E. 313, 323.

**613. Soil and Water Conservation Engineering. (2-3). Credit 3. I**

Soil and water conservation, with emphasis on hydrology of agricultural watersheds, soil erosion theory, functional design of soil and water conservation structures, methods of reducing water losses, and experimental techniques. Prerequisites: Ag.En. 428; C.E. 463.

**685. Problems. Credit 1 to 4 each semester. I, II**

Advanced laboratory or field problems not related to student's thesis. Prerequisite: Graduate classification.

**691. Research. Credit 1 or more each semester. I, II**

Research for thesis or dissertation.

## Department of Air Science

Professor: Colonel Lee; Associate Professors: Lieutenant Colonel Hopkins; Majors Carr, Dudley, Hines, Moore, Walker, Williamson; Assistant Professors: Captains Anderson, Boles, Caleb, Gargus, Johnson, Magers

### THE GENERAL MILITARY COURSE

**101. World Military Systems. (0-3). Credit 1. I**

Introductory course examining causes of contemporary world conflict and influence of military forces upon that conflict. Begins with an investigation of the factors from which differing political philosophies have evolved. Briefly considers prime political philosophies motivating segments of society in this century. The means nations develop to pursue objectives and methods of confrontation are followed by detailed study of the U. S. Department of Defense with emphasis on organization and capabilities of the U. S. Air Force.

**102. World Military Systems. (0-3). Credit 1. II**

Continuation of A.S. 101.

**201. World Military Systems. (0-3). Credit 1. I**

Study of military force levels of selected sovereign states to include survey of U. S. Army and U. S. Navy doctrine, mission and employment concepts. Comparative analysis is made of military systems of free world and Communist world, encompassing NATO, CENTO, SEATO and Soviet Satellite forces. Special emphasis placed upon military organization and capability of USSR and Communist China. Course concludes with study of trends and prospective alignments of world military power.

**202. World Military Systems. (0-3). Credit I. II**

Continuation of A.S. 201.

### THE PROFESSIONAL OFFICER COURSE

**301. Growth and Development of Aerospace Power. (3-0). Credit 3. I**

Analysis in depth of growth and development of aerospace power in the United States. Includes survey of strategic concepts of air warfare produced by Douhet, Mitchell, de Seversky and Trenchard. Studies of contemporary U. S. Air Force tactical and strategic doctrines, followed by consideration of astronautics, space operations, and future development of aerospace power. Includes USAF and NASA space programs, vehicles, systems, and problems in space exploration and surveillance.

**302. Growth and Development of Aerospace Power. (3-0). Credit 3. II**

Continuation of A.S. 301.

**401. The Professional Officer. (3-0). Credit 3. I**

Study of professional requirements demanded of the career officer in the USAF. Emphasis placed on principles of leadership and management. Examines military justice system, leadership theory, principles of personnel management, command coordination and systems of control. Completes education and motivation of cadet for future role as career officer in the USAF.

**402. The Professional Officer. (3-0). Credit 3. II**

Continuation of A.S. 401.

## Department of Animal Science

Professors Butler (Head), Cartwright, Dahlberg, Kunkel, Landmann, Leighton, Moore, Peters, Riggs, Sorensen, Vanderzandt; Associate Professors Ellis, King, Shelton, Weseli; Assistant Professors Bassett, Breuer, Carpenter, Fleege, Franke, Schake, Tanksley, Wythe; Instructors Parrett, Thomas

### ANIMAL SCIENCE SECTION

#### 107. General Animal Science. (2-3). Credit 3. I, II

Introductory course in selection, breeding, feeding, management, and marketing of beef cattle, sheep, Angora goats, and horses. Stresses the importance of the livestock and meat industries.

#### 302. Trends in Livestock Selection. (2-2). Credit 3. II

History of livestock breeding including development of breeds and role of breed organizations. Methods of evaluating traits of economic importance in beef cattle, swine, sheep, goats, and horses and selection programs based on records of performance and visual appraisal.

#### 303. Principles of Animal Nutrition. (3-0). Credit 3. I, II

General chemical composition of feedstuffs and animals; digestion, absorption, metabolism, and function of nutrients; estimation of feedstuff nutritive value and nutrient requirements of animals; an introduction to ration formulation. Prerequisites: Chem. 232 or 228 or enrollment therein.

#### 306. Animal Breeding. (2-2). Credit 3. II; S 1967, 1969

Genetics applied to selection and mating of livestock. Consideration of gene frequency, heritability, relationship, inbreeding, linebreeding, heterosis, selection indexes; use of individual, pedigree, sib, and progeny records. Prerequisite: Gen. 301.

#### 307. Meats. (2-3). Credit 3. I, II

Slaughtering and cutting carcasses of cattle, sheep, and hogs. Factors affecting quality, palatability, and economy in selection of meats. Prerequisite: An.Sc. 107 or approval of Department Head.

#### 309. Feeds and Feeding. (2-2). Credit 3. I, II

Study of principal feedstuffs used in livestock enterprises. Application of basic nutrients to needs of different species of livestock is stressed. Formulating rations; methods of feeding; feed control laws and feeding investigations are presented. Prerequisite: An.Sc. 303.

#### 313. Horse Management and Training. (1-2). Credit 2. I

Breeding, feeding, management, and training of stock and pleasure horses; growing and developing foals; anatomy; unsoundnesses; parasites and diseases; stables and equipment; shoeing; fitting for show and sale.

#### 315. Livestock Judging. (1-3). Credit 2. I

Detailed consideration of factors involved in selection and evaluation of beef cattle, swine, sheep, and Quarter horses. Ability to present accurate, clear, and concise reasons is stressed. Prerequisite: An.Sc. 107 or approval of instructor.

#### 317. Meats Judging. (1-3). Credit 2. I

Detailed consideration of factors involved in selection and grading of carcasses and wholesale cuts of beef, pork, and lamb. Prerequisite: An.Sc. 107 or approval of instructor.

#### 320. Animal Nutrition and Feeding. (3-0). Credit 3. II

Consideration of biochemical and physiological aspects of animal nutrition and role of nutrients. Nutritional requirements of farm animals. Study of feedstuffs and formulation of rations to supply nutritional requirements. For students of Veterinary Medicine. Prerequisite: B.N. 312.

#### 406. Beef Cattle Production. (2-2). Credit 3. I 1966, 1967, 1968; II 1966, 1967, 1968; S 1966, 1968

Consideration of application of principles involved in breeding, feeding, management, disease, parasite control, and marketing of beef cattle. Prerequisite: An.Sc. 303.



**407. Meat Science and Technology. (2-2). Credit 3. II 1967, 1968; S 1966**

Various physical, chemical, microbiological, and other related characteristics of meat and their implications in preparation of commercial meat products. Prerequisites: An.Sc. 307; Chem. 232; or approval of Department Head.

**412. Swine Production. (2-2). Credit 3. I 1966, 1968; S 1967**

Applications of breeding, feeding, sanitation and disease control, management, and marketing to breeding herd and market classes. Use of forage crops; fitting and showing; records. Prerequisite: An.Sc. 303.

**414. Sheep, Goats, and Fiber Technology. (3-2). Credit 4. II**

Methods of management; selection, culling; marketing, environmental factors affecting kid and lamb production; care and feeding flocks. Wool and mohair grading, physical and chemical properties, processing, judging and appraisal. Prerequisite: An.Sc. 303 or approval of Department Head.

**416. Livestock Management. (1-2). Credit 2. II**

Feeding, breeding, management, and marketing of beef cattle, sheep, swine, and horses. Especially designed for agricultural education majors. Prerequisite: An.Sc. 303.

**433. Reproduction in Farm Animals. (2-2). Credit 3. I 1966, 1967, 1968; II 1966, 1967, 1968; S 1966, 1968**

Physiological approach to reproductive processes in farm animals. Study includes hormones; estrus cycles; ovulation; gestation; pregnancy tests; sperm physiology; collection and storage of semen; causes of sterility in females and males. Prerequisite: V.A. 202 or approval of Department Head.

**437. Marketing and Grading of Livestock and Meats. (2-2). Credit 3. I, II**

Factors determining market classes and grades of feeder, stocker, and slaughter animals; grading feeder, stocker, and slaughter animals; marketing machinery and handling market livestock; purebred sales; shipping losses; shrinkage; fills. Prerequisite: Senior classification.

**442. Advanced Livestock Judging. (0-3). Credit 1. II**

Advanced course in selection of breeding livestock and evaluation of slaughter livestock. Live animal evaluation related to carcass desirability. Training is given in methods of conducting livestock judging contests. Prerequisite: An.Sc. 315 or approval of Department Head.

**444. Large Animal Nutrition. (3-0). Credit 3. II 1966, 1968; S 1967**

Study of biochemical and physiological bases for nutritional requirements of non-ruminant and ruminant mammals. Historical consideration of animal nutrition and modern trends in nutritional research. Prerequisites: An.Sc. 303; P.S. 411; or approval of Department Head.

**447. Advanced Meat Selection. (0-3). Credit 1. II**

Advanced course in selection and evaluation of carcasses and wholesale cuts of beef, pork, and lamb as they are correlated with live animal evaluation. Prerequisite: An.Sc. 317 or approval of Department Head.

**481. Seminar. (1-0). Credit 1. I, II**

Review of current literature and research problems related to livestock and foods industries. Prominent men in field of animal and food science may be invited to conduct seminar. For senior students in animal science.

**485. Problems. Credit 1 to 4. I, II, S**

Directed individual study of selected problem in field of animal science. Prerequisites: Senior classification; approval of Department Head.

**FOR GRADUATES****600. Advanced Livestock Management. Credit 3. S**

Special 3-week workshop course for teachers of vocational agriculture to be offered during summer. Includes problems in all phases of animal production selected by group under supervision of instructor.

**604. Ruminant Nutrition. (3-0). Credit 3. I 1966, 1967**

Survey of current knowledge and concepts in ruminant physiology and biochemistry, their literature and experimental basis and relation to current and future nutrition practice and investigation. Basis, applications, and limitations of methods and techniques in ruminant nutrition research. Prerequisites: An.Sc. 444; B.N. 410 or 611 and/or approval of Department Head.

**605, 606. Advancements in Beef Cattle Production. (3-0). Credit 3 each semester. I 1967, 1968; S 1966; II 1967, 1968; S 1966**

Review of research relating to various phases of cattle production. Evaluation of research application of basic principles to nutrition, animal breeding, disease control, and management of beef cattle. Prerequisites: An.Sc. 306, 406, or approval of Department Head.

**607. Meat Science and Research Techniques. (2-2). Credit 3. II 1966, 1968**

Emphasizes biochemical, histological, anatomical, and physical factors associated with transformation of muscle cell into meat. Prerequisite: An.Sc. 407 or approval of Department Head.

**616. Animal Genetics. (3-3). Credit 4. II 1966, 1968; S 1967**

Population and quantitative genetics as related to improvement of individuals or groups within species. Consideration of courses of change in gene frequency, selection methods, mating systems, and estimation of genetic parameters. Prerequisites: Gen. 603; Stat. 406.

**619, 620. Advancements in Sheep and Angora Goat Production. (3-0). Credit 3 each semester. I 1967; II 1967**

Review of research relating to various phases of sheep and Angora goat enterprise. Evaluation of research; fitting sheep and Angora goats to whole farm and ranch system. Special attention to over-all economic operation. Prerequisites: An.Sc. 306, 414; or approval of Department Head.

**621, 622. Advancements in Swine Production. (3-0). Credit 3 each semester. S 1966; I, II 1968**

Review of research relating to various phases of swine enterprise. Evaluation of research; fitting swine to whole farm system. Special attention to over-all economic operation. Prerequisites: An.Sc. 306, 412; or approval of Department Head.

**628. Animal Breeding. (2-0). Credit 2. I 1967, 1969**

Survey of current status of knowledge in field through critical review of literature emphasizing recent developments. Attention focused on methods and techniques for animal breeding and quantitative genetic research. Prerequisite: An.Sc. 616.

**631. Physiology of Reproduction. (2-2). Credit 3. II 1966, 1967; S 1968**

Critique of scientific literature on reproduction. Students compile, evaluate, and summarize literature. Research project proposals are formulated and evaluated. Current topics are discussed and experimental surgery is conducted in area of reproduction. Prerequisite: An.Sc. 433.

**681. Seminar. (1-0). Credit 1 each semester. I 1967, 1968; II 1966, 1967, 1968; S 1966**

Important current developments in field of animal science. Review of current literature and presentation of papers on selected animal science topics. Prerequisites: Graduate classification; major in animal science.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Advanced studies in animal science problems and procedures. Problems assigned according to experience, interest, and needs of individual student. Registration by approval of Department Head. Prerequisite: Graduate classification.

**691. Research. Credit 1 or more each semester. I, II, S**

Investigations leading to student's thesis or dissertation in fields of animal production, meats, wool and mohair, nutrition, inheritance of farm animals, and physiology of reproduction. Prerequisite: Graduate classification.

## DAIRY SCIENCE SECTION

**202. Dairying. (2-2). Credit 3. I, II**

Survey of dairy industry; dairy breeds, standards for selection and culling, herd replacements, feeding, management, and health maintenance. Food value of milk, tests for composition and quality, utilization and processing of market milk and dairy products. Prerequisite: Chem. 101 or 103.

**301. Market Milk. (3-2). Credit 4. I**

Nutritional value of milk; milk and public health; organization of city milk supplies; processing, distribution and inspection of market milk. Prerequisites: Biol. 206; D.S. 202.

**303. Dairy Cattle Judging. (0-3). Credit 1. I**

Comparative judging of dairy cattle. Economic value of dairy type. Student contests and commercial judging techniques. Prerequisite: D.S. 202.

**307. Sensory Evaluation of Dairy Foods. (0-2). Credit 1. II**

Practice in judging and scoring dairy products according to consumer preference, established student contest, and commercial standards. Prerequisite: D.S. 202 or approval of instructor.

**310. Advanced Dairy Cattle Judging. (0-2). Credit 1. II**

Advanced dairy cattle judging with particular attention to show ring type and breed registry association classification. Prerequisite: D.S. 303, or approval of instructor.

**311. Technical Control of Dairy and Related Foods. (2-6). Credit 4. II**

Methods of analysis and their use in controlling composition and quality of dairy and other food products. Prerequisites: Chem. 223, 231; D.S. 301.

**316. Butter and Cheese Manufacture. (3-4). Credit 4. II**

Processing procedures in commercial manufacture of domestic and foreign cheeses; creamery butter manufacture. Prerequisites: D.S. 301, 320.

**320. Bacteriology of Agricultural Products. (2-2). Credit 3. I**

Role of microorganism in the production, processing and distribution of agricultural products. Special emphasis placed on standard microbial techniques recommended by the Americal Society for Microbiology and the American Public Health Association. Prerequisites: Chem. 102 or 104; 3 hours of biology or approval of instructor.

**324. Commercial Dairy Products. (2-2). Credit 3. II**

Manufacture of butter, cheese, condensed and dried milks, and frozen desserts. Required in dairy production option; may be elected by non-majors. Prerequisite: D.S. 202. (Offered in 1965-66 and in alternate years thereafter.)

**326. Food Bacteriology. (3-3). Credit 4. II**

Microbiology of human foods and accessory substances. Study of raw and processed foods, emphasizing the physical, chemical, and biological phases of spoilage. Standard industry techniques of inspection and control. Prerequisite: Biol. 206.

**407. Frozen and Freeze-Dried Dairy Foods. (2-3). Credit 3. II**

The manufacture of ice cream, sherbets, ices and other frozen food products. Preparation of freeze-dried food products. Prerequisites: Ag.En. 213; D.S. 202.

**410. Food Plant Management. (1-2). Credit 2. I**

Dairy plant operating efficiency. Special economy problems related to handling of fluid milk, butter, cheese, and concentrated dairy products. Prerequisite: Senior classification in dairy science or approval of instructor.

**415. Concentrated Dairy and Related Foods. (2-2). Credit 3. II**

The manufacture of concentrated foods, e.g. evaporated milk, sweetened condensed milk, and similar products. Various drying procedures for concentrated foods. Packaging and storing of finished food products. Quality tests on raw and finished products. Prerequisites: Chem. 231 or equivalent; D.S. 301; one semester of physics.



**416. Milk Secretion and Milking. (1-2). Credit 2. I**

Physiology of lactation and relationship between mechanical milking and health and function of bovine mammary gland. Prerequisites: An.Sc. 303 or B.N. 410; Biol. 206.

**417. Dairy Herd Improvement. (2-2). Credit 3. I**

Breeding and development of dairy herd, including artificial insemination, selection of breeding animals, production testing and type classification, breeding programs, herd analysis, and review of development of breeds. Prerequisites: D.S. 202; Gen. 301.

**418. Feeding and Management of Dairy Cattle. (3-2). Credit 4. II**

Feeding, care, and management of dairy herd; calf raising, developing dairy heifers, care of dry and fresh cows, feeding for milk production, disease control, silage, buildings, and related topics. Prerequisites: An.Sc. 303 or B.N. 401; D.S. 202.

**420. Dairy Management. (1-2). Credit 2. II**

Feeding, care and management of dairy cattle, including herd improvement through breed selection, feeding for milk production, development of replacement stock and disease control. For agricultural education majors. Prerequisites: An.Sc. 303; D.S. 202; Gen. 301.

**481. Seminar. (1-0). Credit 1. I, II**

Review of current dairy literature and presentation of papers on selected dairy topics. May be elected a second time for one additional credit. Prerequisite: Senior classification.

**485. Special Problems. Credit 1 to 4. I, II**

Special problems in dairy production or dairy manufactures. May be repeated for additional credit when fewer than four credits have been earned. Prerequisites: Senior classification; approval of Department Head.

**FOR GRADUATES****601, 602. Dairy Production. (2-6). Credit 4 each semester. I, II**

Advanced study of dairy production, feeding, breeding, and management. Prerequisite: D.S. 418.

**603, 604. Dairy Manufactures. (2-6). Credit 4 each semester. I, II**

Advanced study of dairy manufactures. Prerequisites: Graduate classification; approval of instructor.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Study of research methods and review of scientific literature dealing with individually selected problems in production or manufactures and not pertaining to thesis or dissertation. Prerequisite: Graduate classification.

**691. Research. Credit 1 or more each semester. I, II, S**

Research leading to thesis or dissertation in respective fields of dairy production and dairy manufactures. Prerequisite: Graduate classification.

**School of Architecture**

Professors Holleman, Romieniec (Chairman), Rotsch, Strode, Vrooman, White; Associate Professors McGraw, Marsh, Stacell; Assistant Professors Clampitt, Fairey, Harper, Hutton, Kellett, Newton, Pate, Patterson, Steward, Walden, Woodcock; Instructors Allen, Pledger; Lecturer Donaldson

**ARCHITECTURE****101. Design I. (0-6). Credit 2. I, S**

Analysis and application of principles of design, with emphasis on visual elements and basic concept of their organization.

**102. Design I. (0-6). Credit 2. II, S**

Extension of Arch. 101. Further study and application of principles of design, with emphasis on proper use of materials in basic order of space. Prerequisite: Arch. 101.

**115. Architectural Graphics. (1-3). Credit 2. I, S**

Drafting techniques; principles of shades and shadows; perspective drawing.

**116. Architectural Graphics. (1-3). Credit 2. II, S**

Continuation of Arch. 115; perspective drawing; techniques of architectural delineation and graphic design. Prerequisite: Arch. 115.

**201. Design II. (0-12). Credit 4. I**

Extension of first-year design principles and graphics. Studies of structures and structural materials. Site and building relationships. Design of simple buildings. Color selection. Prerequisites: Arch. 102, 116.

**202. Design II. (0-12). Credit 4. II**

Continuation of Arch. 201. More thorough detailing of design solutions, especially in small buildings. Prerequisites: Arch. 201, 205.

**205. Graphic Art. (0-6) Credit 2. I**

Application of principles of design to graphic art concepts, media and techniques. Prerequisites: Arch. 102 for architectural students; equivalent experience preferred for others.

**206. Graphic Art. (0-6). Credit 2. II**

Continuation of Arch. 205. Further application of principles of design to graphic art concepts, media and techniques. Prerequisite: Arch. 205 or equivalent.

**227. Structural Principles. (3-0). Credit 3. I**

Examination of structural systems and their structural, economic, and esthetic suitability as applied to architectural problems. Review of first year mathematics and an introduction to calculus as applied to structural design. Prerequisites: Math. 102, 116, or 121.

**228. Elements of Mechanics. (3-0). Credit 3. II**

Analysis of external effects of force system acting on body at rest. Determination of section properties with emphasis leading to architectural structures. Prerequisite: Arch. 227.

**253. Technology of Materials. (2-0). Credit 2. I**

Study of materials of construction, their properties, manufacture, characteristics, and uses. Prerequisite: Sophomore classification.

**254. Technology of Materials. (2-0). Credit 2. II**

Selection of materials, methods of construction. Prerequisite: Arch. 253.

**301. Design III. (0-15). Credit 5. I**

Intermediate design stressing complete solutions to individual problems. Emphasis on concept, methods, and materials of construction. Seminars dealing with architectural and related design fields. Prerequisite: Arch. 202.

**302. Design III. (0-15). Credit 5. II**

Further studies in intermediate design enlarging upon Arch. 301. Prerequisite: Arch. 301.

**305. Graphic Art. (0-6). Credit 2. I**

Continuation of Arch. 206. Advanced application of principles of design to graphic art concepts, media, and techniques. Prerequisite: Arch. 206 or equivalent.

**306. Graphic Art. (0-6). Credit 2. II**

Continuation of Arch. 305. Advanced application of principles of design to graphic art concepts, media, and techniques. Prerequisite: Arch. 305 or equivalent.

**325. Survey of Contemporary Art. (1-0). Credit 1. I**

Survey of development of contemporary art; objectives, terminology, idioms, techniques, and media of painting, sculpture and graphic arts; their relation to architecture and allied arts. Prerequisites: Junior classification for architecture students; sophomore classification for others.

**326. Survey of Contemporary Art. (1-0). Credit 1. II**

Extension of Arch. 325, with emphasis on relating contemporary art trends to cultural and technological developments. Prerequisite: Arch. 325 or equivalent.

**327. Basic Structures. (3-0). Credit 3. I**

Fundamentals of strength of materials with emphasis on their application to architectural structures. Prerequisite: Arch. 228.

**328. Steel Structures. (3-0). Credit 3. II**

Application of principles of statics and strength of materials to design of architectural steel structures. Prerequisite: Arch. 327.

**331. Mechanics and Materials. (2-3). Credit 3. I**

Terminal course designed to acquaint student with general principles of mechanics and strength of materials and to give him some facility in their application to simple framing systems. (For students in Industrial Education.) Prerequisites: M.E. 101; Phys. 201.

**335. Mechanical and Electrical Equipment for Buildings. (3-0). Credit 3. I**

Study of systems of mechanical and electrical equipment and their components. Various systems of plumbing, piping, heating, cooling, electrical distribution and wiring studied in their relation to building construction. Prerequisites: Phys. 202; junior classification.

**336. Mechanical and Electrical Equipment for Buildings. (3-0). Credit 3. II**

Continuation of Arch. 335. Further study is made of components of mechanical and electrical equipment as to their logical applications in completed systems of plumbing, space conditioning, and electrical wiring. Prerequisite: Arch. 335.

**339. Art and Civilization. (3-0). Credit 3. I**

Historical survey of cultures of man with respect to art and architecture. Prerequisite: Junior classification.

**340. History of Architecture. (3-0). Credit 3. II**

Historical study of development of architecture from Pre-Classical through Greek and Roman Classical, Early Christian, Byzantine, Saracenic, and Romanesque periods. Prerequisites: Arch. 339 for students in architecture; junior classification for others.

**401. Design IV. (0-15). Credit 5. I**

Architectural and planning problems, with emphasis on analysis, research and design. Study of relationship of architecture, landscape architecture, city and regional planning, and other related design fields. Prerequisite: Arch. 302.

**402. Design IV. (0-15). Credit 5. II**

Continuation of Arch. 401, with architectural and planning problems of a more complex nature. Prerequisite: Arch. 401.

**427. Concrete Structures. (3-0). Credit 3. I, S**

Study of reinforced concrete for architectural structures; analysis and design; systems of forming. Prerequisite: Arch. 328.

**428. Roof Structure. (3-0). Credit 3. II, S**

Analysis and design of conventional roof systems; roof trusses, beams and columns, and current roof deck systems. Prerequisite: Arch. 328.

**433. Architectural Environment. (3-0). Credit 3. I, II**

Study of environmental factors related to architectural design in terms of natural lighting, natural ventilation, and sound. Prerequisites: Phys. 202; junior classification.

**439. History of Architecture. (3-0). Credit 3. I**

Historical study of development of architecture from Gothic through Renaissance and Post-Renaissance periods of Europe. Prerequisite: Arch. 340.

**440. History of Architecture. (3-0). Credit 3. II**

Historical study of American Period architecture; background, principles, philosophies, and significant figures of Contemporary Movement in America and Europe. Prerequisite: Arch. 439.

**454. Specifications and Working Drawings. (1-6). Credit 3. I, II**

Detailed specifications; supervision and superintendence; building laws and codes; working drawings. Prerequisite: Arch. 254.



**500. Summer Practice. Twelve weeks; required; no credit. S**

Summer practice in architectural offices or with building contractors as student may be registered in Design or Construction curriculum. Required previous to registration for fifth year.

**501. Design V. (0-15). Credit 5. I**

Advanced architectural and planning problems, with emphasis on analysis, programming, research, site study, concept, consideration of related design fields, client contact and promotion. Prerequisite: Arch. 402.

**502. Design V. (0-15). Credit 5. II**

Continuation of Arch. 501; problems of more complex nature, with emphasis on awareness of office practice. Prerequisite: Arch. 501.

**527. Structural Systems. (3-0). Credit 3. I**

Advanced studies in systems of architectural structures. Prerequisites: Arch. 427, 428.

**528. Structural Systems. (3-0). Credit 3. II**

Study of structural problems as related to actual professional practice; special consideration of design factors, new materials, codes, economy, specification surveys of costs. Prerequisite: Arch. 527.

**554. Professional Practice. (2-0). Credit 2. I, II**

To familiarize student with usual problems of office practice, professional relations, ethics, building law, and contracts. Prerequisite: Senior classification.

**556. City Planning. (2-3). Credit 3. I**

Survey of planning principles and procedures; legal aspects; physical and social development of city; housing. Prerequisite: Senior classification.

**581. Seminar. (1-0). Credit 1. II**

Seminars presented orally by students, faculty, and professional people, with subjects relating to architecture and construction of buildings. Prerequisite: Fifth year classification.

**585. Problems. Credit 1 to 5 each semester. I, II, S**

Special projects in architecture, landscape architecture, or construction. Project must be approved by Chairman of School of Architecture. Prerequisites: Fifth year classification in architecture or senior classification in landscape architecture; approval of Chairman of School.

**FOR GRADUATES****627. Contemporary and Creative Structures. (2-2). Credit 3. I**

Studies and analysis of contemporary and creative structures as related to architectural design, with emphasis on esthetic considerations, structural limitations and design, functional use, construction procedures and estimates of cost. Prerequisite: Arch. 528 or equivalent.

**628. Contemporary and Creative Structures. (2-2). Credit 3. II**

Continuation of Arch. 627. Studies and analysis of contemporary and creative structures as related to architectural design with emphasis on esthetic considerations, structural limitations and design, functional use, construction procedures, and estimates of cost. Prerequisite: Arch. 627.

**629, 630. History and Archaeology. (2-0). Credit 2 each semester. I, II**

Individual problems of study and research in field of American architecture and archaeology.

**681. Seminar. (1-0). Credit 1 each semester. I, II, S**

Review of current work in architecture; original presentation on selected topics.

**685. Problems. Credit 1 to 4. I, II, S**

Individual problems involving application of theory and practice in design and construction of buildings and groups of buildings.

**691. Research. Credit 2 to 4 each semester. I, II, S**

Research for thesis.

## LANDSCAPE ARCHITECTURE

### 201. History of Landscape Design. (3-0). Credit 3. II

Study of art of landscape design from earliest efforts to present day. Lectures, reference reading, library sketches, and reports.

### 300. Summer Practice. Ten weeks, required. No credit. S

Approved summer practice with recognized landscape architect or nursery.

### 304. Landscape Construction. (2-3). Credit 3. I

Treatment of various phases of work included in landscape development. Finish grading, drainage, and preparation of detailed drawings. Field practice in construction phases. Prerequisite: C.E. 201.

### 305. Planting Design. (1-3). Credit 2. II

Use of plant materials in composition of landscape design. Study of mass form and texture of plant materials in relation to one another as well as to structures and site development. Plans, sketches, and models. Prerequisites: Flor. 307; Land. 320.

### 320. Landscape Design I. (0-12). Credit 4. I

Delineation of landscape forms; drafting, lettering, and introductory composition, analysis and solution of typical site problems. Prerequisites: Arch. 102, 116; Flor. 307.

### 321. Landscape Design II. (0-12). Credit 4. II

Second course in landscape design. Arranged to give general knowledge of various problems met in practice of landscape architecture, including private, semi-public, and public areas. Prerequisites: C.E. 201; Land. 320.

### 404. Landscape Construction. (2-3). Credit 3. I

Continuation of Land. 304. More advanced problems in landscape development. Prerequisite: Land. 304.

### 411. Landscape Design for the Architect and Engineer. (2-2). Credit 3. I

Study of technical requirements involved in landscape development of residential, industrial, and other outdoor areas. Special emphasis on relationship of architectural and engineering professions to such developments. Not open to students majoring in landscape architecture.

### 420. Landscape Design III. (1-15). Credit 6. I

Major landscape design problems and their respective applications. Private estates, parks, subdivisions, and other private and public areas. Plans, sketches, and models. Prerequisite: Land. 321.

### 421. Landscape Design IV. (1-15). Credit 6. II

Advanced landscape design. Continuation of Land. 420. More advanced problems are assigned with added emphasis on city and regional planning. Prerequisite: Land. 420.

## Department of Biochemistry and Nutrition

Professors Camp, Couch, Kunkel, Lyman (Head), Prescott, Reiser, Richardson;  
Associate Professors Creger, Dieckert, Whitehouse; Assistant Professors Bottino,  
Daron, Widmer; Instructors Cater, Thomas; Lecturer Crookshank

### 312. Veterinary Physiological Chemistry. (3-6). Credit 5. I

Study of the chemical nature of physiological processes, including synthesis and breakdown of body tissues and chemical changes undergone by metabolites from ingestion to excretion. Prerequisite: Chem. 228.

### 401. Human Nutrition. (3-0). Credit 3. I

Study of the functions of food constituents in health and in physiological stress. Economic, national, and international aspects of human nutrition. Prerequisite: Junior classification.

### 410. Introductory Biochemistry. (3-3). Credit 4. I, S

Chemistry of the major constituents of living organisms. Biophysical and biochemical processes in plants and animals are stressed. Laboratory work includes application of quantitative analytical procedures to plant and animal tissues and fluids. Prerequisites: Chem. 223, and 231 or 228.

**430. Electron Microscopy. (2-3). Credit 3. II**

Principles and laboratory practice in electron microscopy and electron diffraction. Applications in all technical departments of the University are included. Prerequisite: Senior or graduate classification in any University department, or approval of instructor.

**485. Problems. Credit 1 to 4 each semester. I, II, S**

For advanced undergraduates to permit laboratory investigations or study of subject matter not included in established courses. Prerequisite: Approval of Department Head.

(See An.Sc. 444 and P.S. 411 for descriptions of related courses.)

**FOR GRADUATES****611. General Biochemistry. (3-0). Credit 3. I**

Chemistry of the principal constituents of living cells, with introduction to intermediary metabolism. Prerequisites: Chem. 228, 316, 318.

**612. Laboratory Procedures in Biochemistry. (0-6). Credit 2. I**

Laboratory course designed to familiarize student with application of chemical and biological methods to solution of fundamental biochemical problems. Prerequisite: B.N. 611 or registration therein.

**613. Vitamins. (3-0). Credit 3. II**

Role of vitamins in animal nutrition and metabolism. Occurrence in plant and animal tissues. Specific functions of vitamins in enzyme systems. Prerequisite: Chem. 228.

**614. The Determination of Vitamins and Minerals. (0-3). Credit 1. II**

Laboratory course designed to familiarize student with methods for determination of vitamins and minerals in biological materials. Prerequisite: B.N. 613 or registration therein.

**615. Experimental Animal Procedures. (0-3). Credit 1. II**

Laboratory course involving management, preparation of purified rations, and production and cure of nutritional diseases. Prerequisite: B.N. 614 or registration therein.

**618. Chemistry and Metabolism of Lipids. (2-0). Credit 2. II**

Advanced course in lipid chemistry and metabolism. Prerequisite: B.N. 611.

**619. Proteins. (2-0). Credit 2. I**

Advanced studies on chemical, physical, and biological properties of proteins. Particular emphasis placed on biological synthesis and metabolism of proteins. Prerequisite: B.N. 611.

**620. Advanced Biochemical Techniques. (0-6). Credit 2. S**

Laboratory course using special techniques and instruments in isolation, identification, and analysis of biological compounds. Prerequisites: B.N. 612, 624.

**624. Enzymes. (2-0). Credit 2. II**

General principles of enzyme chemistry. Physical chemistry of enzyme action. Types of enzymes and coenzymes. Enzymes in patterns of metabolism. Prerequisites: B.N. 611; Chem. 324 or 342; or approval of instructor.

**626. Radioisotopes Techniques. (2-3). Credit 3. I**

General course on the nature and utilization of isotopes in chemical and biochemical studies. History, general properties of nuclei, nuclear reactions, radiations; health physics and instrumentation. Prerequisites: Chem. 316, 317; Phys. 201, 202.

**627. Mineral Nutrition and Metabolism. (2-0). Credit 2. II**

Study of the role of minerals in animal nutrition with emphasis on physiological function, biochemical interrelationships with other minerals and other nutrients, deficiency symptoms and nutritional significance. Prerequisite: B.N. 410 or 611.

**630. Metabolism. (3-0). Credit 3. II**

Descriptive consideration of various chemical pathways of metabolism. Prerequisites: B.N. 611, 613.



**632. Radioactive Tracer Techniques in Metabolism. (1-3). Credit 2. II**

Use of isotopes in measuring metabolic pool, precursor-product relationships, isotopic competition, cycles and intermediates, permeability, adsorption and absorption, and assay of common elements. Prerequisites: B.N. 612, 626, or approval of instructor.

**634. Techniques in Lipid Chemistry. (0-6). Credit 2. II**

Designed to acquaint student with recently developed techniques in chemical and biochemical investigations on lipids. Prerequisites: B.N. 612, and 618 or registration therein.

**640. Clinical Chemistry. (2-6). Credit 4. II**

Study of the quantitative distribution of body constituents and their physiological interpretations. Prerequisites: B.N. 312 or 410 or 611, or Biol. 433, or V.P.P. 427.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Study of discussion of original articles in biochemistry and nutrition and related fields designed to broaden understanding of problems in the field and to stimulate research.

**685. Problems. Credit 1 or more each semester. I, II, S**

Advanced course in biochemical laboratory procedures including preparations and instrumentation. Problems assigned according to experience, interests, and needs of individual student.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis or dissertation. Laboratory facilities available for original investigations in various phases of biochemistry and nutrition. Prerequisite: Approval of major advisor.

(See Gen. 631 for full description of related course.)

## Department of Biology

Professors Brown, Dillon, Dobson, Gravett, Hopkins, Krise, Mackin (Head), Read, Sperry; Associate Professors Chin, Taber; Assistant Professors Clark, Engleman, Foster, Harry, McLain, Sweet; Instructors Cooper, Gennaro, Hashmi, Hughes, Little, Seabury, Sissom

Courses in the biological sciences administered by the Department of Biology include sequential programs in botany, microbiology, and zoology. All courses, irrespective of subject matter area, bear the departmental designation (Biology), and a course number from a single numerical sequence. The nature of the offerings is more clearly indicated, however, by the subject matter grouping shown on the following pages.

### GENERAL BIOLOGY

**115. Survey of Biology. (3-3). Credit 4. I, II**

Summarization of biological forms and principles and their impact upon man and his affairs.

**330. Life Science. (2-0). Credit 2. I, II**

Readings of grouped essays covering major subdivisions of life science together with integrating lectures. Prerequisite: Junior classification. (Not open to those with more than 7 hours of credit in biology.)

**337. Organic Evolution. (2-0). Credit 2. I, II**

Study of evidences of evolution of plants, animals, and man. Phylogeny and interrelationships of living things, main lines of evolution, origin of species; man and the future considered.

**439. The Development of the Biological Sciences. (2-0). Credit 2. II**

Survey of beginnings of development of biological discoveries; lives and contributions of outstanding biologists. Prerequisite: Twelve hours of biological science or approval of instructor.

**481. Seminar in Biology. (1-0). Credit 1. I**

Recent advances. Restricted to senior undergraduate majors in microbiology, botany, or zoology.

**482. Seminar in Biology. (1-0). Credit 1. II**

Integration of branches of biological science. Restricted to senior undergraduate majors in microbiology, botany, or zoology.

**485. Biological Problems. Credit 1 to 4. I, II**

Problems in various phases of plant, animal, and bacteriological science. Prerequisites: Junior classification; approval of ranking professor in field chosen.

**FOR GRADUATES****600. Teaching of High School Biology. (2-3). Credit 3. S**

Study of techniques of teaching biology in secondary school. Laboratory emphasizes exercises useful in high school biology laboratory. Prerequisite: Approval of Heads of Biology and Education and Psychology Departments.

**654. Radiation Biology. (3-0). Credit 3. I**

Review of physical theory of ionizing radiations important to living organisms; X-ray, gamma, alpha, beta and neutron. Survey of effects of ionizing radiations on biological systems. Prerequisite: Graduate classification in biological or agricultural science.

**655. Mammalian Radiation Biology. (3-0). Credit 3. II**

Lecture and demonstration on effects of X-ray, gamma, alpha, beta, and neutron radiation on mammalian organisms. Both early and delayed effects emphasized. Use of radioactive materials in mammalian biology will be introduced. Prerequisites: Biol. 654; graduate classification.

**660. Aquatic Ecology. (2-3). Credit 3. II**

Study of fresh water as an environment; its physical and chemical characteristics and plant and animal communities which inhabit it. Prerequisite: Approval of instructor.

**661. Cellular Physiology. (2-3). Credit 3. II**

Consideration of physiochemical nature of cell and its relationship to environment with emphasis on conversion of energy and matter as required by cell as living unit. Prerequisites: Graduate classification in biology or animal or plant science; approval of instructor.

**681. Seminar. (1-0). Credit 1. I, II**

Detailed reports on specific topics in field chosen. Prerequisite: Graduate classification in appropriate field.

**685. Problems. Credit 1 to 4 each semester. I, II**

Limited investigations in fields other than those chosen for thesis or dissertation.

**691. Research. Credit 1 or more each semester. I, II**

Research for thesis or dissertation. Prerequisite: Approval of ranking professor in field chosen.

**BOTANY****101. General Botany of Seed Plants. (2-3). Credit 3. I, II**

The plant as a living unit; external and internal structures in relation to life processes; reproduction and life history.

**102. Taxonomy of Flowering Plants. (2-3). Credit 3. I, II**

Designed to give training in use of keys and in identification of flowering plants, family characteristics and relationships, and other applied phases of plant science. Prerequisite: Biol. 101.

**327. Fundamental Plant Morphology. (2-3). Credit 3. I**

Structural, reproductive, and taxonomic features of representatives of major plant groups, with particular attention to groups not covered in Biol. 101. Prerequisite: Biol. 101.

**353. Mycology. (2-3). Credit 3. II**

Introduction to study of fungi, including structure, reproduction, ecological relationships, and taxonomic aspects. Prerequisite: Biol. 101 or approval of instructor. (Offered in 1966-67 and in alternate years thereafter.)

**453. Plant Anatomy. (2-3). Credit 3. I**

Fundamental anatomy of vegetative and reproductive organs of plant with emphasis on development of tissue types. Prerequisite: Six hours of plant sciences including Biol. 327 or equivalent.

**FOR GRADUATES****608. Ecology and Taxonomy of the Algae. (2-6). Credit 4. I**

Study of form, structure, reproduction, and ecology of the algae. Prerequisite: Biol. 327 or 353 or approval of instructor.

**615. Cytology. (2-6). Credit 4. I**

Intensive study of organization and activities of cell, with emphasis on topics related to cytogenetics and cytotaxonomy. Prerequisites: Gen. 301; approval of instructor.

**619. Systematic Botany. (2-6). Credit 4. I**

Phylogenetic considerations and criteria. History of classification. Nomenclature and identification. Field and herbarium techniques. Prerequisites: Biol. 102, 327, or approval of instructor.

**620. Systematic Botany. (2-6). Credit 4. II**

Survey of angiosperms. Biosystematics and modern taxonomy. Procedures in monograph preparation. Monographers. Field and herbarium techniques. Prerequisite: Biol. 619.

**623. Plant Morphology. (2-6). Credit 4. II**

Study of anatomical, reproductive, and ontogenetic and phylogenetic features of representative vascular plants. Prerequisite: Biol. 327 or equivalent.

**651. Mycology. (2-6). Credit 4. II**

Detailed studies of fungi, with emphasis on life cycles of representative forms; genetics and cytology; taxonomy; ecology. Prerequisite: Biol. 353 or approval of instructor. (Offered in 1965-66 and in alternate years thereafter.)

**MICROBIOLOGY****206. Introductory Microbiology. (2-4). Credit 3. I, II**

Relation of microorganisms to agriculture, industry, and health of man, animals, and plants. Prerequisites: Chem. 102 or 104; 3 hours of biology.

**351. Fundamentals of Microbiology. (3-4). Credit 4. I**

Basic microbiology; comparative morphology, taxonomy, pathogenesis, ecology, variation, physiology of microorganisms. Prerequisites: Chem. 227; 3 hours of biology; or approval of instructor.

**352. Diagnostic Bacteriology. (2-4). Credit 3. I**

Theories of taxonomy and practice of identifying pathogenic and saprophytic bacteria stressed in laboratory. Prerequisite: Biol. 351.

**438. Bacterial Physiology. (2-6). Credit 4. I**

Detailed study of physiological activities of bacteria. Prerequisite: Biol. 351. (Offered in 1966-67 and in alternate years thereafter.)

**457. Bacterial Ecology. (2-6). Credit 4. II**

Relation of bacteria to their environment, especially to other microorganisms. Methods of isolation, identification, and differentiation. Prerequisite: Biol. 351. (Offered in 1965-66 and in alternate years thereafter.)

**458. Medical Microbiology. (2-4). Credit 3. II**

Consideration of human pathogenic bacteria, epidemiology of infectious diseases, and stress theory and practice of serology and immunology. Prerequisite: Biol. 351. (See Biol. 353, 661; D.S. 320, 326; and V.Mi. 301 for descriptions of related courses.)

**FOR GRADUATES****635. Physiology of Microorganisms. (2-6). Credit 4. I**

Advanced consideration of physiological activities of bacteria with special emphasis on metabolism. Prerequisite: B.N. 312 or 410. (Offered in 1966-67 and in alternate years thereafter.)



**647. Industrial Microbiology. (2-6). Credit 4. II**

Microorganism as basis of industrial processes. Practice includes antibiotic assay; analysis of products of metabolism and fermentation balances. Prerequisites: B.N. 312 or 410. (Offered in 1965-66 and in alternate years thereafter.)

(See Biol. 608, 630, 651; P.P.P. 607, 618, 620 for descriptions of related courses.)

**ZOOLOGY****107. Vertebrate Zoology. (2-3). Credit 3. I, II**

Structure, physiology, and development of animals; emphasis on biology of vertebrates.

**108. Invertebrate Zoology. (2-3). Credit 3. I, II**

Classification, comparison, anatomy, and physiology of invertebrate animals. Specimens from more important invertebrate phyla studied in laboratory. Prerequisite: Biol. 107 or approval of instructor.

**217. Comparative Anatomy of Vertebrates. (2-4). Credit 3. I**

Comparative anatomy of Prochordates and lower vertebrates through Reptilia. Laboratory animals: Molgula, Dolichoglossus, Amphioxus, Squalus, Necturus, and Phrynosoma. Prerequisites: Biol. 107, 108.

**218. Comparative Anatomy of Vertebrates. (2-4). Credit 3. II**

Comparative anatomy of birds and mammals. Laboratory animals: chicken and cat. Prerequisite: Biol. 217.

**219. Mammalian Anatomy. (2-3). Credit 3. I**

Principles of normal anatomy of cat and man. Nature and causes of mechanical injuries of man. Prerequisite: Biol. 107.

**220. Physiology and Hygiene. (2-3). Credit 3. II**

Continuation of Biol. 219. Normal and abnormal physiology of man. Prerequisite: Biol. 219.

**325. Physical Anthropology. (3-0). Credit 3. II**

Man's relation to and position in animal kingdom. Physical characteristics of mankind. Fossil and living types. Races and racial characteristics. Prerequisite: Three hours of biological science.

**343. Histology. (2-3). Credit 3. I**

Normal tissues of vertebrates including histogenesis of some. Histogenesis and organography of mammalian tissues reviewed. Prerequisite: Biol. 217.

**344. Embryology. (2-3). Credit 3. II**

Introduction to general and comparative vertebrate embryology; emphasis on early development of frog, chick, and pig. Prerequisite: Biol. 217.

**422. Microtechnique. (1-6). Credit 3. II**

Standard methods in preparation of permanent microscopic slides of plant and animal tissues. Prerequisite: Twelve hours of biological science, including Biol. 343.

**433. General Physiology. (3-3). Credit 4. I**

Fundamental physiology of protoplasm; basic processes and functions of organs and systems. Emphasis placed on digestion, respiration, metabolism, excretion, muscular contraction, and reproduction. Prerequisites: Biol. 107 and either graduate classification, Biol. 218, or equivalent.

**434. Circulatory and Nerve Physiology. (3-3). Credit 4. II**

Comparative functions of circulatory, nervous system, and of organs of special sense. Prerequisites: Biol. 218; or Biol. 107 and senior or graduate classification in an animal science.

**435. Advanced Invertebrate Zoology. (3-3). Credit 4. I**

Morphology, taxonomy, biology, and phylogeny of invertebrate animals. Prerequisite: Biol. 107 or approval of instructor.

**436. Animal Parasitology. (3-3). Credit 4. II**

Study of parasitic worms and protozoa; laboratory methods in parasitology. Prerequisite: Biol. 435 or equivalent.

## FOR GRADUATES

**603. Advanced Vertebrate Zoology. (1-5). Credit 3. II**

Phylogeny of vertebrates based on comparative anatomy, histology, embryology, and distribution. Prerequisites: Biol. 218, 343, 344, or equivalent.

**604. Advanced Embryology. (1-5). Credit 3. I**

Comparative and experimental studies of mechanics of embryonic development. Prerequisites: Biol. 218, 343, 344, or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**627. Helminthology. (3-3). Credit 4. I**

Study of parasitic worms, especially Trematoda, Cestoda, Nematoda, and Acanthocephala. Prerequisite: Biol. 436. (Offered in 1966-67 and in alternate years thereafter.)

**630. Protozoology. (3-3). Credit 4. I**

Morphology, taxonomy, physiology, reproduction, phylogeny, ecology, and life history of both free living and parasitic protozoa. Prerequisite: Biol. 108. (Offered in 1965-66 and in alternate years thereafter.)

**632. Methods in General Physiology. (2-6). Credit 4. II**

Methods for quantitative study of metabolism, respiration, circulation, excretion, movement, and other basic physiological phenomena. Recent advances in physiological methods presented on seminar basis. Prerequisite: Biol. 433 or equivalent.

**649. Biology of the Endocrine Glands. (3-3). Credit 4. I**

Study of structure, development, comparative anatomy, and physiology of endocrine glands of different animal groups. Prerequisites: Three hours of either anatomy or anatomy and physiology.

**653. Zoogeography. (3-0). Credit 3. II**

Study of distribution of animals during geologic and present times; emphasis on role of ecology and effects of geography upon terrestrial and marine distribution. Prerequisite: Twelve hours of biological sciences including at least 3 hours of advanced courses.

**656. Analytical Histology. (2-6). Credit 4. II**

Designed to acquaint student with certain quantitative histochemical techniques in plant and animal science as applied to nucleoproteins, carbohydrates, lipids, and enzymes. Prerequisites: Biol. 343 or 453 or equivalent; Chem. 227.

**662. Biology of the Mollusca. (3-3). Credit 4. I, II, S**

Conferences and laboratory work on classification, life history, morphology, physiology, ecology, diseases, parasites, predators and competitors of molluscs, with special reference to oysters. Prerequisite: B.S. degree in biology or related fields, or approval of instructor.

## Department of Business Analysis

Associate Professors Burgess, Luker (Head); Assistant Professor Jenkins;  
Instructor Dipple

**254. Administrative Communications. (3-0). Credit 3. I, II**

The nature and dynamics of communications in organizations. Prerequisites: Engl. 104; sophomore classification.

**303. Statistical Method. (3-3). Credit 4. I, II, S**

Collection, tabulation, presentation, and analysis of data. A study of sampling, graphics, averages, dispersion, skewness, probability and error, index numbers, barometers, correlation. Prerequisite: Math. 102.

**304. Business Cycles and Business Measurements. (3-0). Credit 3. I, II, S**

Empirical and statistical study of economic fluctuations: theory, causes, and control of business cycles; business barometers and forecasting; economic and statistical studies. Prerequisite: B.Anal. 303.

**317. Punch Card Methods. (1-2). Credit 2. I, II**

Instruction and practice in operation of punch card machines for handling of accounting and statistical data. Prerequisites: Acct. 228; B.Anal. 303.

**337. Data Processing. (2-2). Credit 3. I, II**

Use of electronic computers for recording and reporting, sorting; searching; collating; file maintenance; integrated data processing; coding of information; storage of information. Prerequisite: Junior classification.

**FOR GRADUATES****646. Business Trends, Fluctuations, and Measurements. (3-0). Credit 3. I, S**

Study of business trends and economic fluctuations; theory; causes and control of cyclical behavior; analytical forecasting; economic and statistical services. Prerequisites: Graduate classification; approval of graduate advisor.

**666. Quantitative Analysis for Business Decisions. (3-0). Credit 3. II, S**

Quantitative techniques including statistics, inventory control, game theory, capital budgeting, simulation, linear programming, pricing. Prerequisites: Graduate classification in business administration; approval of graduate advisor.

**680. Business Policy. (3-0). Credit 3. I, II, S**

Case study governing functions of production, distribution, and finance; analysis and decision making; a comprehensive business game. Prerequisites: Graduate classification in business administration; approval of graduate advisor.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Critical examination of subject matter presented in current periodicals, recent monographs and bulletins in field of quantitative methods applied to business.

**685. Problems. Credit 1 to 3 each semester. I, II, S**

Directed study on selected problems using recent developments in business research methods. Prerequisites: Graduate classification; approval of instructor.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis.

**Department of Chemical Engineering**

Professors Harris, Holland (Head), Meinke; Associate Professors Davison, Eubank, Harris; Assistant Professors Darby, Durbin

**204. Elementary Chemical Engineering. (3-0). Credit 3. I, II**

Solution of elementary problems on application of mass balances, energy balances, and equilibrium relationships. Prerequisites: Chem. 102 or 104; Math. 122 or 210 or registration therein.

**304. Unit Operations. (3-0). Credit 3. I, II**

Study of fluid and heat flow, evaporation and drying. Prerequisite: Ch.E. 204.

**314. Chemical Engineering Laboratory I. (0-3). Credit 1. II**

Laboratory work based on Ch.E. 304. Prerequisite: Ch.E. 304.

**409. Models of Chemical Processes. (3-0). Credit 3. I**

Development of the mathematical models of chemical and physical processes common to the petroleum processing, chemical and associated industries. Prerequisite: Ch.E. 423.

**423. Unit Operations. (3-0). Credit 3. II, S**

Continuation of Ch.E. 304 covering distillation, gas absorption, filtration, size reduction, separation, and mixing. Prerequisite: Ch.E. 304.

**424. Unit Operations. (3-0). Credit 3. I**

An introduction to transport theory: fluid dynamics, heat transfer and mass transfer. Prerequisite: Ch.E. 423.



**426. Plant Design. (2-6). Credit 4. II**

Solution of problems involved in design and development of chemical engineering plants. Interrelation of fundamentals covered in courses is demonstrated. Prerequisite: Ch.E. 424.

**428. Industrial Chemical Processes. (3-0). Credit 3. II**

Study of representative chemical manufacturing processes and their relationships. Prerequisite: Ch.E. 424.

**429. Chemical Engineering Laboratory III. (0-3). Credit 1. I**

Process dynamics and control laboratory with work to accompany Ch.E. 409 and Ch.E. 461.

**433. Chemical Engineering Laboratory II. (0-3). Credit 1. I**

Laboratory work based on Ch.E. 423 and 424. Prerequisite: Ch.E. 314.

**454. Chemical Engineering Thermodynamics. (3-0). Credit 3. I**

Study of applications of thermodynamics to chemical engineering processes and operations. Prerequisites: Chem. 324; Ch.E. 423.

**461. Process Control and Instrumentation. (2-0). Credit 2. I**

Study of fundamental principles and methods used in measurement and control of process variables such as pressure, temperature, and flow rate. Prerequisite: Ch.E. 423.

**464. Chemical Engineering Kinetics. (3-0). Credit 3. II**

Introduction to kinetics of reactions and application of fundamental principles to design and operation of commercial reactors. Prerequisites: Ch.E. 424, 454.

**481. Seminar. (1-0). Credit 1. I**

Oral discussion of selected topics from recent technical publications. Prerequisite: Senior classification.

**485. Advanced Problems in Chemical Engineering. Credit 1 to 5. I, II**

Work covers one or more of numerous problems in chemical engineering processes or operations. Prerequisites: Ch.E. 423; approval of Department Head.

**FOR GRADUATES****605. Chemical Engineering Economics. (3-0). Credit 3. I**

Advanced calculations involving process design and process control as limited by least cost or maximum profit. Problems based on various unit operations and unit processes. Prerequisite: Ch.E. 424.

**606. Unit Operations. (3-0). Credit 3. II**

Applications of chemical engineering fundamentals in manufacture of chemicals, refining petroleum, and other allied industries. Prerequisite: Ch.E. 424.

**608. Heat Transmission. (3-0). Credit 3. I**

Process and process design calculations on equipment involving transfer of heat by conduction, convection, and radiation. Prerequisite: Ch.E. 424.

**612. Distillation. (3-0). Credit 3. I**

Process and process design calculations involving distillation of multicomponent and complex systems. Extractive and azeotropic distillation are covered. Prerequisite: Ch.E. 424.

**619. Corrosion and Materials of Construction. (3-0). Credit 3. I**

Uses of materials of construction to preclude high corrosion rates in process equipment. Prerequisite: Ch.E. 424.

**623. Applications of Thermodynamics to Chemical Engineering. (3-0). Credit 3. II**

Study of applications of thermodynamics to chemical engineering operations and processes. Prerequisite: Ch.E. 454.

**624. Chemical Engineering Kinetics I. (3-0). Credit 3. I**

Study of rates and mechanisms of chemical reactions. Thermal and catalytic reactions both homogeneous and heterogeneous are considered. Prerequisite: Ch.E. 424.

**625. Chemical Engineering Kinetics II. (3-0). Credit 3. II**

Study of physical factors affecting chemical reaction rates and of methods for design of reaction equipment. Prerequisite: Ch.E. 624.

**626. Oil and Fat Technology. (3-0). Credit 3. I**

Study of composition and properties of oils and fats, methods of extraction and purification, and their industrial utilization. Prerequisites: Ch.E. 423; Chem. 228.

**627. Oil Mill Operation. (2-6). Credit 4. I**

Study of theoretical and practical operating characteristics of various units used in vegetable oil production. Economic factors of each unit and their over-all effect on plant operation. Prerequisite: Ch.E. 626 or registration therein.

**629. Transport Phenomena. (3-0). Credit 3. I**

Principles of transfer of momentum, energy, and mass studied by application to advanced chemical engineering problems. Theoretical analogy of these three modes of transfer will be emphasized. Prerequisite: Ch.E. 424.

**631. Process Dynamics I. (3-0). Credit 3. I**

Study of dynamics, simulation and control of linear models of fluid, thermal, and mass transfer processes for chemical industries by means of transient and frequency response analysis and design methods. Prerequisites: Ch.E. 461; Math. 601; or registration therein.

**632. Process Dynamics II. (3-0). Credit 3. II**

Continuation of Ch.E. 631. Theory and application of discrete, non-linear, and stochastic dynamic analysis and optimal design policies to processes in chemical and allied fields. Prerequisite: Ch.E. 631.

**681. Seminar. (1-0). Credit 1. I, II**

Graduate students will be required to attend one hour per week to discuss problems of current importance in connection with their research.

**685. Problems. Credit 1 to 6. I, II, S**

The work covers one or more of numerous problems in chemical engineering processes and operations. Prerequisite: Approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Problems of unit operations and unit processes. For maximum credit comprehensive thesis must be prepared of sufficiently high calibre to permit publication in scientific and technical journals. Prerequisite: Approval of Department Head.

## Department of Chemistry

Professors Calaway, Gladden, Haight, Hancock, Harrington, Isbell (Acting Head), Suttle, Traxler, Whealy, Zingaro, Zwolinski; Associate Professors Alexander, Beckham, Conway, Danti, Hedges, Lee, Meyers, Page, Rakoff, Rose, Sicilio, Wilhoit; Assistant Professors Jones, Menon; Instructors Smentowski, Spurluck

**101. General Chemistry. (3-3). Credit 4. I, II, S**

Fundamental laws and theories of chemical activity. Practical applications of chemical processes involving non-metals are briefly described. Laboratory work deals with non-metals and simple tests of technical importance.

**102. General Chemistry. (3-3). Credit 4. I, II, S**

Fundamental theories of structure and activity. Practical application of chemical processes involving metals described. Organic chemistry is outlined. Laboratory work consists of qualitative separation and identification of metallic and non-metallic ions. Prerequisite: Chem. 101.

**103. Chemical Principles. (3-3). Credit 4. I**

Chemical principles and their application. For student of superior aptitude and interest. Laboratory work provides opportunity for individual experimentation. Prerequisite: For entering students with high scores on algebra and chemistry placement examinations.

**104. Chemical Principles. (3-3). Credit 4. II**

Continuation of Chem. 103. Laboratory work consists mainly of semi-micro qualitative analysis with ample opportunity for individual experimentation. Prerequisite: Chem. 103.

**106. General Chemistry. (3-3). Credit 4. II**

Survey course in chemistry for students needing it as cultural subject and not as basis for advanced work.

**223. Elementary Quantitative Analysis. (2-3). Credit 3. I, II**

Basic principles and theories of quantitative analysis, both gravimetric and volumetric. Treatment not highly mathematical. Laboratory work designed to illustrate basic techniques. Not open to engineering students. Prerequisite: Chem. 102 or 104.

**226. Chemical Calculations. (2-0). Credit 2. I**

Advanced review of chemical calculations of general chemistry with special emphasis on stoichiometry and chemical equilibrium. Prerequisite: Chem. 102 or 104.

**227. Organic Chemistry. (3-3). Credit 4. I, II, S**

Introduction to chemistry of compounds of carbon. Study of general principles and their application to various industrial and biological processes. Laboratory work serves as basis of course. Prerequisite: Chem. 102 or 104.

**228. Organic Chemistry. (3-3). Credit 4. I, II, S**

Continuation of Chem. 227. Prerequisite: Chem. 227.

**231. Elementary Organic Chemistry. (3-0). Credit 3. I, II, S**

Study of aliphatic series of organic compounds including introduction to benzene series and to vitamins, proteins, and related substances. Applications taken from field of agriculture. Not open to engineering students. Prerequisite: Chem. 102 or 104.

**232. Elementary Organic Chemistry. (4-3). Credit 5. I, II, S**

Study of hydrocarbons and their derivatives. Applications taken from field of agriculture, including introduction to proteins, carbohydrates, fats, vitamins, and related products. Laboratory designed to familiarize student with preparation, properties, and relations of typical organic compounds. Prerequisite: Chem. 102 or 104.

**316. Quantitative Analysis. (2-0). Credit 2. I, II, S**

Introduction to methods of chemical analysis. Special attention given to chemical equilibrium. Prerequisite: Chem. 102 or 104.

**317. Quantitative Analysis. (2-0). Credit 2. II**

Introduction to theory and practice of optical and electrical methods of analysis. Prerequisite: Chem. 316.

**318. Quantitative Analysis Laboratory. (0-3). Credit 1. I, II, S**

Laboratory work consists of selected experiments in quantitative analysis designed to typify operations of general application. Work is primarily volumetric with limited gravimetric experiments. Prerequisite: Chem. 316 or registration therein.

**319. Quantitative Analysis Laboratory. (0-6). Credit 2. I, II, S**

Laboratory work consists of selected experiments in quantitative analysis designed to typify operations of general application. Work is primarily volumetric with limited gravimetric experiments. Prerequisite: Chem. 316 or registration therein.

**320. Instrumental Analysis Laboratory. (0-6). Credit 2. II**

Introduction to use of electrical and optical measurements in chemical analysis. Prerequisite: Chem. 317 or registration therein.

**323. Physical Chemistry. (3-0). Credit 3. I, II**

Explanation and mathematical development of theories and principles of chemistry. Gas laws, thermodynamics, thermochemistry, liquids, solutions. Prerequisites: Chem. 316; Math. 122 or 210.

**324. Physical Chemistry. (3-0). Credit 3. II, S**

Intensive study of homogeneous and heterogeneous equilibria, phase rule, chemical kinetics, catalysis, hydrogen-ion concentration, electrolytic and galvanic cells and electrochemistry, photochemistry, and radioactivity. Prerequisite: Chem. 323.



**325. Physical Chemistry Laboratory. (0-3). Credit 1. I, II**

Experiments substantiate theories and principles developed in theory course, Chem. 323. Prerequisite: Chem. 323 or registration therein.

**326. Physical Chemistry Laboratory. (0-3). Credit 1. II, S**

Experiments substantiate theories and principles developed in theory course, Chem. 324. Prerequisite: Chem. 324 or registration therein.

**342. Physical Chemistry. (3-3). Credit 4. II**

Explanation of basic chemical theories and principles with reference to their relationship to transformations in living matter. Prerequisites: Chem. 227, 316.

**380. Chemical Bibliography. (1-0). Credit 1. II**

Study of chemical library with instruction in use of chemical journals, reference books, and other sources of information. Prerequisite: Junior classification.

**447. Qualitative Organic Analysis. (2-6). Credit 4. I**

Identification of principal classes of organic compounds. Prerequisite: Chem. 228.

**461. Physical Chemistry. (3-0). Credit 3. I**

Topics in undergraduate physical chemistry not covered in Chem. 323 and 324. Atomic structure, molecular structure and properties. Prerequisite: Chem. 324.

**462. Inorganic Chemistry. (3-0). Credit 3. I**

Periodic relationship of elements, their compounds, principles of their bonding and applications. Prerequisite: Chem. 324.

**463. Inorganic Chemistry. (2-3). Credit 3. II**

Continuation of Chem. 462. Laboratory work consists of preparation and analysis of inorganic compounds designed to introduce student to basic preparative techniques. Prerequisite: Chem. 462 or approval of instructor.

**464. Nuclear and Radiochemistry. (2-3). Credit 3. II**

Chemical aspects associated with production and application of nuclear energy; principles of separations and utilization of radioactivity and radiation. Less extensive than Chem. 661. Prerequisites: Chem. 317, 324 or approval of instructor.

**481. Seminar. (1-0). Credit 1. II**

Oral discussion of selected topics from technical publications.

**485. Problems. Credit 1 to 4. I, II, S**

Introduction to research, library, and laboratory work. Prerequisites: Senior classification; approval of Department Head.

**FOR GRADUATES****600. Survey of Chemistry. (2-3). Credit 3. I**

Survey course designed for teachers of high school chemistry. Prerequisites: Graduate classification; approval of Heads of Departments of Chemistry and of Education and Psychology.

**607. Organic Techniques and Preparations. (1-6). Credit 3. II**

Study of laboratory operations theory and description and comparison of equipment used in advanced work. Application of techniques of organic chemistry in laboratory. Prerequisite: Chem. 646 or registration therein.

**608. Qualitative Organic Analysis. (1-6). Credit 3. I**

Analysis of organic compounds. Prerequisite: Chem. 228.

**609. Theory of Organic Chemistry. (3-0). Credit 3. II**

Development and application of chemical theories to organic compounds. Prerequisite: Chem. 646.

**610. Organic Reactions. (3-0). Credit 3. II**

Relatively detailed study of organic reactions, not only those commonly described in undergraduate course but also the less well known but equally useful reactions. Advantages and limitations of these reactions in organic syntheses. Prerequisites: Chem. 609, 646 or their equivalent.

**611. Principles of Physical Chemistry. (3-0). Credit 3. I**

Study of general principles of chemistry from quantitative standpoint. Discussion of gases, liquids, and solutions. Prerequisite: Graduate classification.

**620. Principles of Chemical Analysis. (3-0). Credit 3. II**

Advanced survey of principles of chemical analysis with special emphasis on newer developments in field of analytical chemistry. Prerequisite: Chem. 317.

**621. Chemical Kinetics. (3-0). Credit 3. I**

Study of some of present theories about chemical reaction rates and mechanisms. Prerequisite: Chem. 324.

**624. Physico-Organic Chemistry. (3-0). Credit 3. II**

Mathematical and quantitative investigation of organic chemical phenomena. Prerequisite: Chem. 609 or approval of instructor.

**625. Petroleum Chemistry. (3-0). Credit 3. II**

Practical and theoretical consideration of chemical reactions of petroleum hydrocarbons. Prerequisites: Chem. 228, 324. (Offered in 1965-66 and in alternate years thereafter.)

**626. Thermodynamics. (3-0). Credit 3. I**

Theory and applications of classical thermodynamic functions. Prerequisite: Chem. 324.

**627. Diffraction Methods. (3-0). Credit 3. II**

Introduction to use of diffraction methods for determination of molecular structure. Major emphasis placed on results of diffraction of X-rays by crystals but related methods are also discussed. Prerequisites: Chem. 324; Math. 601 or equivalent; approval of instructor.

**628. The Non-Metallic Elements. (3-0). Credit 3. I**

Study of non-metals and their compounds. Recent developments. Knowledge of German or French desirable. Prerequisite: Chem. 324.

**630. The Metallic Elements. (3-0). Credit 3. I**

Study of metals and their compounds. Recent developments. Knowledge of German or French desirable. Prerequisite: Chem. 324.

**631. Statistical Thermodynamics. (3-0). Credit 3. II**

Introduction to methods of statistical mechanics based primarily on Boltzmann statistics. Approach to thermodynamics through partition function. Statistical concept of entropy. Prerequisite: Chem. 626.

**635. Heterocyclic Compounds. (3-0). Credit 3. I**

Structure, preparation, and properties of heterocyclic compounds with special emphasis on those with biological activity. Prerequisite: Chem. 228. (Offered in 1966-67 and in alternate years thereafter.)

**636. Electrochemistry. (3-0). Credit 3. I**

Advanced treatment of conductivity, electrochemical, thermodynamics, galvanic cells, electrodeposition, and corrosion. Prerequisite: Chem. 324.

**639. Instrumental Methods of Analysis. (2-3). Credit 3. I**

Study of theory and practice of modern techniques of chemical analysis. Laboratory work illustrates use of these instruments for routine analytical work and as research tools. Prerequisite: Chem. 317.

**641. Structural Inorganic Chemistry. (3-0). Credit 3. I**

Study of nuclear and extranuclear structure, isotopes, valency of elements, and stereochemistry of inorganic compounds. Prerequisite: Chem. 462.

**642. Methods of Structural Chemistry. (3-0). Credit 3. II**

Study of theory, methods, and application of structural determination (arrangement and bonding) of chemical species. Prerequisite: Chem. 641 or approval of instructor. (Offered in 1964-65 and in alternate years thereafter.)

**643. Inorganic Complex Compounds. (3-0). Credit 3. II**

History, theories, and methods of investigations of inorganic complex compounds. Prerequisite: Chem. 462. (Offered in 1965-66 and in alternate years thereafter.)

**644. Quantitative Organic Analysis. (1-6). Credit 3. I**

Determinations: Macro Dumas, sulfur, Carius halogen, Micro residue, fractionation, Micro Dumas, catalytic hydrogenation, carbon and hydrogen, Micro Kjeldahl, Rast molecular weight, molar refraction, active hydrogen, alkaxyl, semi-micro saponification number. Prerequisites: Chem. 228; reading knowledge of German.

**646. Organic Chemistry. (3-0) Credit 3. I**

Systematic and thorough presentation of organic chemistry on advanced level. Prerequisite: Chem. 228.

**648. Principles of Quantum Mechanics. (3-0). Credit 3. I**

Brief review of classical mechanics and development of wave mechanics. Application of wave mechanics to special chemical problems. Prerequisite: Approval of instructor.

**649. Molecular Quantum Mechanics. (3-0). Credit 3. II**

Continuation of Chem. 648. Introduction to group theoretical methods and applications in molecular quantum mechanics and elements of ligand field theory. Prerequisite: Chem. 648.

**650. Molecular Spectra and Structure. (3-0). Credit 3. II**

Introduction to molecular spectroscopy and its relations to structure, theoretical treatments, quantum and wave mechanics, vibrations and normal coordinates, molecular symmetry, and group theory. Prerequisite: Qualifying graduate students in chemistry and physics, or approval of instructor.

**651. Advances in Physical Chemistry. (2-0). Credit 2. S**

Recent advances in such areas as surface chemistry and catalysis, properties of high molecular weight polymers and their solutions, photochemistry and theories of liquids and solutions. Prerequisites: Chem. 324 or its equivalent; approval of instructor.

**652. Advances in Analytical Chemistry. (2-0). Credit 2. S**

Recent advances and special methods in field of analytical chemistry. Methods will be discussed in terms of their basic theory, particular advantages, limitations, and required instrumentation. Prerequisite: Chem. 620.

**653. Advances in Organic Chemistry. (2-0). Credit 2. S**

Special topics of current interest in organic chemistry, which are not normally covered in sufficient depth in other courses. Most subjects will be taken from recent or current chemical literature. Prerequisite: Chem. 646 or approval of instructor.

**654. Advances in Inorganic Chemistry. (2-0). Credit 2. S**

Discussion of topics such as boron hydrides, crystal field theory, inorganic reaction mechanisms, organometallic chemistry and nuclear chemistry. Prerequisite: Chem. 641.

**661. Radiochemistry. (2-3). Credit 3. II**

General course dealing with radioactive materials; their radiations; their preparation, purification, detection, identification, and their practical applications. Material on nuclear structures, nuclear transmutations, and radioactivity. Prerequisite: Chem. 324.

**685. Problems. Credit 1 to 6. I, II, S**

Special topics to suit small group requirements. More recent problems and results in various branches of chemistry. Laboratory work or conference and discussion. Prerequisite: Graduate classification.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis or dissertation.



## Department of Civil Engineering

Professors Baty, Benson, Buchanan, Furr, Gallaway, Harrington, Holcomb, Keese, Orr, Samson (Head), Scrivner, Smerdon, Sorrels, Traxler, Wright; Associate Professors Drew, Hirsch, Pinnell, Schiller, Smith; Assistant Professors Coyle, Davis, Dunlap, Hann, Ivey, Layman, Ledbetter, Lowery, Mayer, Olson, Reynolds, Rowan, Stallworth, Sweet, Tidwell, Wattleworth; Instructors Buhr, Harper, Miller

### 201. Plane Surveying. (3-3). Credit 4. I, II

Measurement of distances; use and care of surveying equipment; measurement of angles; land surveys and computations; stadia and plane table surveys; route surveys; horizontal and vertical curves; earthwork computations. Prerequisite: Math. 103.

### 206. Plane Surveying. (0-3). Credit 1. I, II

Fundamental principles of surveying; use of transit and level; boundary surveys, area computations, profile surveys. Prerequisite: Math. 103.

### 208. Topographic Surveying. (1-3). Credit 2. I, II

Fundamental principles of surveying; use of transit and level; special emphasis placed on use of plane table in topographic mapping. Prerequisite: Math. 103.

### 300. Summer Surveying Practice. Credit 5. S

Six weeks of surveying practice. Horizontal and vertical control; base line measurements; transit-stadia surveys; plane table surveys; boundary surveys; area and co-ordinate computation; polaris and solar observations; route surveys. Stream gauging. Prerequisite: C.E. 201.

### 301. Water and Sewage Treatment. (2-2). Credit 3. I, II, S

Principles and methods of water purification and sewage treatment and disposal; laboratory demonstrations of control tests and correlation of results with treatment plant operation; interpretation of reports; inspections of local plants. Prerequisites: Chem. 102 or 104; C.E. 311.

### 305. Mechanics of Materials. (3-0). Credit 3. I, II, S

Axial stresses and strains; stresses on various planes; properties of materials; stresses in thin-walled cylinders; torsional and flexural stresses and strains; shear and moment diagrams; equation of elastic curve; moment area theorems; combined loadings; column behavior. Prerequisites: Math. 122 or 210; M.E. 212 or equivalent.

### 306. Mechanics of Materials. (2-0). Credit 2. I, II, S

Stresses and strains at a point including both analytical and graphical methods; theories of failures; fundamentals of riveted and welded joints; unsymmetrical bending; thick-walled cylinders; curved beams in flexure. Prerequisite: C.E. 305.

### 307. Highway Engineering. (3-0). Credit 3. I, II, S

Location, design, drainage, construction, and maintenance of highways, streets, and pavements. Road laws, finances, highway organizations and supervision briefly considered. Prerequisites: C.E. 300, 338, 365 or registration therein.

### 311. Hydraulics. (3-0). Credit 3. I, II

Laws governing action of water at rest and in motion, flow of water in pressure mains, sewers, aqueducts, open channels, and rivers; measurement of flow of water by nozzle, orifices, weirs and meters; flow of viscous fluids. Prerequisite: M.E. 212 or equivalent.

### 315. Strength of Materials Laboratory. (0-2). Credit 1. I, II

Laboratory study of mechanical behavior of engineering materials; determination of strength and other properties of selected materials; conventional and true stress-strain; failure mechanisms, creep, stability. Prerequisite: C.E. 305 or registration therein.

### 336. Hydraulics Laboratory. (0-2). Credit 1. I, II

Calibration of nozzles, orifices, water meters, weirs, pressure gauges; measurement of pipe friction; measurement of pipe flow; efficiency tests on impulse motor, hydraulic ram, and centrifugal pump. Prerequisite: C.E. 311 or registration therein.

### 338. Hydraulics of Drainage Structures. (2-0). Credit 2. I, II

Elementary study of rainfall and run-off and hydraulics of culverts and drainage structures; flow in open channels. Prerequisite: C.E. 311.

**345. Theory of Structures. (3-0). Credit 3. I, II, S**

Introduction to structural engineering; loads, reactions, and force systems; reactions and forces in beams, three-hinged arches, and trussed structures; moment area method applications, moment distribution method of analyzing statically indeterminate structures, forces, and reactions in bents and portals; influence lines and criteria for moving loads. Prerequisite: C.E. 306 or registration therein.

**346. Design of Members and Connections. (2-3). Credit 3. I, II, S**

Design of tension members, compression members, beams, riveted joints, and welded joints. Theory and practice as indicated in typical current specifications. Prerequisite: C.E. 345.

**348. Engineering Economy. (2-0). Credit 2. I, II**

Analysis of operating costs of engineering projects including interest, depreciation, fixed costs, overhead. Comparison of first cost economy versus ultimate economy. Prerequisite: Junior classification in engineering.

**350. Design of Formwork and Falsework. (2-0). Credit 2. II**

Design of wood beams, columns, tension members, and connections; design of formwork and falsework for conventional and special concrete structures using all conventional material. Formwork detailing and construction procedures. Prerequisite: C.E. 345.

**351. Construction Engineering Summer Practice. Twelve weeks; required; no credit. S**

Summer practice with general contractor engaged in building, highway, heavy or other important construction. Minimum of 6 weeks work in construction in field, preferably apprenticeship in basic trade or work associated with heavy equipment operation or maintenance. Minimum of 6 weeks in contractor's office or time and cost keeping or survey party experience in field.

**365. Soil Mechanics and Foundations. (2-2). Credit 3. I, II, S**

Introduction to soil mechanics and its application in civil and architectural engineering; origin, formation processes, and types of soils. Methods of exploration and soil testing required for design of various types of foundations, retaining walls, and other engineering structures. Prerequisites: C.E. 305; Geol. 320 or 422.

**402. Water Supply and Sewerage Practice. (2-2). Credit 3. I, II**

Development of sources of water supply; determination of quantity of storm water and domestic sewage; water supply distribution systems, sewer systems, and general features of water purification and sewage treatment plants; appurtenances and treatment plant equipment. Prerequisites: C.E. 301, 338.

**403. Sanitary Design. (2-3). Credit 3. II**

Practical problems in design of sewer systems and appurtenances; sewage treatment plant; water collection and distribution systems; water purification plants. Prerequisite: C.E. 402 or registration therein.

**404. Critical Path Methods in Engineering and Management. (1-0). Credit 1. II**

Detailed study of critical path scheduling as a means of construction organization and control; deterministic and probabilistic approaches and applications; organization of large projects, time schedules, and allocation of resources. Prerequisite: Senior classification in architecture or civil engineering.

**406. Sanitation and Public Health. (3-0). Credit 3. I**

Sanitation and public health; residential water supply and excreta disposal methods; municipal sanitary work, plumbing; control of food supplies; mosquito, fly, and rodent control; sanitation of swimming pools; industrial hygiene; organization of health departments. Prerequisite: Junior classification.

**408. Municipal Administration. (3-0). Credit 3. I**

City government, including city manager plan; relation of city to state; administration of city departments; public utilities; city planning. Prerequisite: Junior classification.

**417. Bituminous Materials. (2-3). Credit 3. II**

Origin, production, specifications, and tests of bituminous materials and mixtures used in construction and maintenance of roads and pavements. Prerequisites: Senior classification in engineering; C.E. 307 or registration therein.

**435. Soil Engineering. (2-3). Credit 3. I**

Design and construction of earth dams and coffer dams; design of footings, drilled piers, and pile substructures; design and construction of embankments and subgrades for roads and airfields; seepage through earth masses. Prerequisites: C.E. 365; senior classification.

**443. Materials of Construction. (2-3). Credit 3. I, II**

Laboratory tests, supplemented with theory of portland cement, coarse and fine aggregates, concrete mixture design, air entrained and lightweight aggregate concrete. Prerequisite: Senior classification.

**444. Reinforced Concrete Structures. (3-3). Credit 4. I, II, S**

Analysis and design of reinforced concrete beams, columns, slabs, and footings using elastic and ultimate strength methods. Prerequisite: C.E. 345.

**456. Highway Design. (2-3). Credit 3. II**

Theory and practice in highway design. Highway classification and design criteria, location studies, design of vertical and horizontal alignment, cross section, pavement, intersections and highway drainage elements. Prerequisite: C.E. 307.

**457. Urban Traffic Facilities. (3-0). Credit 3. I**

Study of vehicle operating characteristics, traffic flow, geometric design of roads, streets, and intersections, and methods of traffic control. Prerequisites: C.E. 201, 307 or registration therein; Phys. 219.

**458. Hydraulic Engineering. (3-0). Credit 3. II**

Flow in pipes and complex pipe systems; non-uniform flow in open channels; pumping machinery; elementary hydraulic model theory. Prerequisite: C.E. 338.

**463. Hydrology. (3-0). Credit 3. I**

Study of occurrences and measurements of precipitation and stream flow, relations between precipitation and run-off; estimating seepage; evaporation, run-off; surface, and flood discharges for drainage basins. Prerequisite: C.E. 311.

**470. Aerial Photogrammetry. (2-3). Credit 3. II**

Study of photogrammetric optics, characteristics of aerial photographs, aerial cameras, map projections, ground control, radial plots, mosaics, interpretation of aerial photographs, stereoscopic plotting instruments, and mapping from oblique photographs. Prerequisite: C.E. 201.

**473. Cost Estimating. (3-0). Credit 3. I, II, S**

Approximate and detailed estimates of cost of construction projects including earthwork, foundations, concrete, masonry, steel, and miscellaneous items. Costs are developed to include materials, equipment, labor, overhead, and profit. Prerequisite: Senior classification.

**478. Construction Plant and Methods. (3-0). Credit 3. I, II**

Plant and equipment selection for earthwork, foundations, concrete and structural steel, based on performance and economy. Construction schedules, progress reports, and performance records. Prerequisite: Senior classification in engineering or architecture.

**481. Seminar. (1-0). Credit 1. I, II**

Methods of job procurement subsequent to graduation; responsibilities and obligations of young civil engineer; professional ethics; membership in professional societies, professional registration; lectures by staff and practicing engineers. Prerequisite: Senior classification.

**483. Analysis and Design of Structures. (2-3). Credit 3. I, II**

Over-all procedure of analysis and design, including functions, loads, layouts of force systems, analysis, design drafting, specifications, cost comparisons, and maintenance as applied to typical simple bridge and building structures. Prerequisites: C.E. 346, 365, 444.

**485. Problems. Credit 1 to 3. I, II, S**

Research and design problems of limited scope approved on an individual basis intended to promote independent study. Results of study presented in writing. Prerequisite: Approval of Department Head.



**486. Prestressed Concrete. (2-3). Credit 3. II**

Basic theory; prestressing systems; design of determinate beams for flexure, shear, bond, and bearing. Deflections. Design of slabs and of continuous beams. Circular prestressing. Tension and compression members. Connections. Prerequisite: C.E. 483.

**488. Construction Equipment. (2-0). Credit 2. II**

Equipment operating characteristics, maintenance procedures and scheduling. Work capability, planning, scheduling, and control. Highway and heavy construction equipment and major equipment used in building construction. Prerequisite: C.E. 478.

**490. Construction Planning. (2-3). Credit 3. II**

Planning, scheduling, and control of complete job operations. Case studies in building construction, highways, and heavy construction. Traditional and computer methods of job scheduling and management including critical path techniques. Prerequisites: C.E. 473, 478.

(See S.M. 468, 469, 470, for descriptions of related courses.)

**FOR GRADUATES****601, 602. City Management. (4-0). Credit 4 each semester. I, II**

Development of European and American cities; forms of city government; functions of city manager; administration of municipal affairs; organization of city departments; city finances; public utilities, fire prevention and protection, police administration; parks and playgrounds.

**603. Sewage Treatment and Stream Sanitation. (4-0). Credit 4. I**

Processes of sewage treatment and requirements regarding quality of sewage treatment plant effluents in relation to sanitary protection of receiving waters. Prerequisite: C.E. 402.

**604. Water Quality and Treatment. (4-0). Credit 4. II**

Characteristics of available sources of water, standards of quality of public water supplies, and theories of treatment and purification processes, with special attention given to details of methods and units employed to effect these processes. Prerequisite: C.E. 402.

**607, 608. Environmental Sanitation. (4-0). Credit 4 each semester. I, II**

Environment and its relation to disease; rodent control; sanitation of milk, shellfish, and other foods; collection and disposal of municipal refuse; sanitary aspects of air conditioning; housing sanitation; rural water supply and excreta disposal; sanitary inspection procedure.

**610. Industrial Wastes. (4-0). Credit 4. II**

Amount and characteristics of common industrial wastes; their effects upon sewage treatment; methods of treatment. Prerequisite: C.E. 301 or equivalent.

**612. Transportation in City Planning. (2-2). Credit 3. I, S**

Importance of transportation in urban development and planning. Role of engineer in planning. Relationship of transportation to planning studies, land use, zoning, planning legislation, and administration. Prerequisite: Graduate classification in College of Engineering.

**615. Structural Design of Flexible Pavements. (2-0). Credit 2. I**

Characteristics of pavement loads, stress analysis in flexible pavements, design practices, construction and maintenance. Prerequisite: C.E. 307.

**617. Traffic Engineering: Characteristics. (2-3). Credit 3. I**

Advanced theory and practice of engineering studies of traffic characteristics. Methods of traffic administration. Prerequisite: C.E. 457.

**618. Traffic Engineering: Operations. (2-3). Credit 3. II**

Advanced theory and application of traffic control and design of traffic facilities. Traffic regulations. Prerequisite: C.E. 617.

**619. Highway Problems Analysis. (2-3). Credit 3. II**

Advanced techniques in statistics, aerial photogrammetry, and data processing in solution of problems in highway and traffic design and research. Students should have knowledge of computer programming and basic statistics. Prerequisites: C.E. 617; I.En. 414.

**620. Structural Design of Rigid Pavements. (2-0). Credit 2. II**

Theory of rigid pavement design, design practices, maintenance, and construction. Prerequisite: C.E. 307.

**621. Advanced Reinforced Concrete Design. (3-0). Credit 3. I**

Flat slabs, continuous building frames, torsion, deep beams, bulk storage structures, creep and temperature change effects. Prerequisite: C.E. 444.

**622. Hydraulics of Drainage Structures. (2-3). Credit 3. II**

Hydraulics of open channels, bridge openings, culverts, head walls, surface street drainage, storm sewers, gutters, drop inlets and spillways. Theory of model studies as applied to drainage of highways, streets, and freeways. Prerequisite: C.E. 338 or equivalent.

**625. Geometric Design of Highways. (2-3). Credit 3. I**

Advanced theory and practice in highway design. Design controls and criteria, elements of design, design of alignment, cross-section, intersections and interchanges, multilane expressways, and drainage structures. Prerequisites: C.E. 307, 365.

**627. Hydrology. (3-3). Credit 4. I**

Precipitation, stream gaging methods, evaporation and transpiration, groundwater, hydrograph analysis, flood hydrographs from rainfall and snow, snow melt. Stream flow routing, frequency and duration. Studies, sedimentation, storage reservoir design, graphical correlation, airfield drainage.

**628. Hydraulic Engineering. (3-0). Credit 3. II**

Boundary layer theory, fluid flow in pipes, complex pipe networks, dimensional analysis, similitude and models, gradually and rapidly varied flow in open channels, backwater curves in natural streams, stilling basin design problems. Prerequisite: C.E. 338.

**629. Hydraulics of Open Channels. (3-3). Credit 4. I**

Advanced problems in uniform and non-uniform flow in open channels; hydraulic jump; control section; backwater profiles. Prerequisite: C.E. 338.

**632. Advanced Design in Metals. (2-3). Credit 3. II**

Properties of high-strength and other special materials. Stress concentrations and fatigue. Design of complex members and connections such as: curved columns, fixed bases, and rigid-frame knees. Prerequisites: C.E. 483; S.M. 468.

**633. Advanced Mechanics of Materials. (4-0). Credit 4. II, S**

Stresses and strains at a point, torsion of non-circular cross sections, beams with combined axial and lateral loads, built-up columns, lateral buckling of beams, torsional buckling of centrally loaded columns, bending of thin plates and shells. Prerequisites: Aero. 306 or C.E. 306; Math. 308.

**634. Airfield Planning and Design. (2-0). Credit 2. II**

Regional planning, air traffic routing, landing requirements, methods for development of master plans for site selection, airfield design requirements involving layouts, pavement selection, and design. Review and application of criteria of design of drainage for all types of fields.

**636. City Street Design. (2-0). Credit 2. S**

Street classification and function. Design of city streets, intersections, access drives, and pavements. Street drainage. Financing city street improvements. Prerequisite: C.E. 307.

**640. Freeway Design and Operation. (2-0). Credit 2. S**

Characteristics of traffic flow on controlled access facilities. Advanced theory and practice in operation on freeways and related street systems. Freeway traffic control. Material based on advanced research of Texas Transportation Institute. Prerequisite: C.E. 618.

**643. Plastic Analysis and Design in Steel. (3-0). Credit 3. I, S**

Principles and methods that are basis for plastic analysis and design. Static and mechanism methods of analysis of structures. Influence of shear and axial forces on plastic design. Effect of lateral buckling. Design of connections to provide plastic action. Prerequisite: Graduate classification in civil engineering or approval of instructor.

**649. Soil Mechanics. (3-3). Credit 4. I**

Study of foundation materials as they exist and of various types of soils, their physical properties, testing procedure, and principles of classification. Prerequisites: C.E. 365; Geol. 320.

**650. Soil Mechanics. (3-3). Credit 4. II**

Foundation explorations, laboratory investigations of undisturbed foundation samples, stress distribution through soils; foundation design, correlation of settlement data from actual observations, stability of embankments, backfill pressures. Prerequisite: C.E. 649.

**651. Advanced Theory and Application of Soil Mechanics. (3-3). Credit 4. I**

Special lectures, discussions and applications of theory to solution of major problems encountered in practice of soil engineering, embracing the fields of seepage, earth work design, foundation design, port structures, and special problems. Prerequisite: C.E. 650.

**653. Flexible Materials of Construction. (2-3). Credit 3. I**

Theory supplemented with laboratory tests of bitumen, tars, and plastics. Stabilization of base and subgrade materials. Advanced mix design and evaluation of test methods; rheology and chemistry of asphalt. Prerequisite: C.E. 417.

**654. Rigid Materials of Construction. (2-3). Credit 3. II**

Physical and chemical properties of rigid materials of construction; laboratory tests of different kinds of concrete, tests of metals and laminates; theory of corrosion of ferrous metal; corrosion mitigation; shrinkage and plastic flow of stressed concrete; design of concrete mixtures. Prerequisite: C.E. 443.

**656. Concrete Structures Testing Laboratory. (1-3). Credit 2. II**

Methods and equipment used in testing reinforced concrete structures and elements of structures. Observations of behavior in compression, flexure, shear, torsion, and combinations thereof. Correlations with theory, both elastic and plastic. Prerequisite: C.E. 621.

**657. Dynamic Loads and Structural Behavior. (3-0). Credit 3. I**

Forces resulting from wind, other moving fluids, earthquake, blasts, impact, moving loads, and machinery. Dynamic behavior of various structures and structural elements under action of such loads. Self-induced vibration. Prerequisites: C.E. 483; M.E. 459; S.M. 468.

**659. Folded Plates and Shells. (3-0). Credit 3. II**

General theory and design procedures for thin-shell and folded-plate structures. Characteristics, use, construction, problems, and economic factors. Membrane theory for shells. Edge effects and effects of unsymmetrical loading. Prerequisite: S.M. 469 or equivalent.

**664. Water Resources Development. (3-0). Credit 3. II**

Conservation and utilization of water resources with emphasis on legal, social, and economic phases of watershed planning and multi-purpose projects. Prerequisites: Graduate classification; approval of Department Head.

**666. Foundation Structures. (2-3). Credit 3. II**

Spread footings, combined footings, and raft foundations. Retaining walls, piles, and pile foundations. Sheet-pile structures, cofferdams, wharves, and piers. Bridge piers and abutments. Prerequisites: C.E. 365 or equivalent; graduate classification in civil engineering.

**667. Highway Structures. (3-3). Credit 4. I**

Structural analysis and design of bridges, grade separation structures, retaining walls, and culverts. Loads materials, comparisons of different types and economic proportions. Current standards, new developments, and current cost information. Prerequisites: C.E. 483, 625.

**669. Bituminous Technology. (2-0). Credit 2. I, II**

Methods and techniques used in evaluating chemical, physical, colloidal and rheological properties of asphaltic materials. Available data will be discussed and a study made of methods for evaluating durability of asphalt. Prerequisite: C.E. 417.



**670. Bituminous Technology. (2-0). Credit 2. I, II**

Procedures used in selecting and processing crude oil for manufacture of asphalt; fundamental properties of asphaltic cutbacks, asphalt emulsions and mineral filled bitumens. Requirements of asphalts for use in roads, roofing and special applications. Prerequisite: C.E. 669.

**673. Urban Transportation. (2-2). Credit 3. II**

Planning urban transportation facilities; special emphasis on trip generation, trip distribution and traffic assignment on digital computers; transportation system planning and evaluation: consideration of all modes of transportation. Prerequisites: C.E. 612.

**681. Seminar. (0-2). Credit 1. I, II, S**

Reports and discussion of current research and of selected published technical articles. May not be taken for credit more than once in Master's degree program and twice in Ph.D. program. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 6 each semester. I, II, S**

Enables majors in civil engineering to undertake and complete with credit in their particular fields of specialization limited investigations not within their thesis research and not covered by other courses in established curriculum.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis or dissertation.

(See S.M. 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, for descriptions of related courses.)

## Department of Economics

Professors Chalk (Head), Linger; Associate Professors Putnam, Treacy; Assistant Professors Bitner, Bridges, Glasgow, Miller, Pulsipher

**203. Principles of Economics. (3-0). Credit 3. I, II, S**

Elementary principles of economics; the economic problem, measurement and determination of national income, money and banking, and theory of price. Prerequisite: Sophomore classification.

**204. Principles of Economics. (3-0). Credit 3. I, II, S**

Analysis of economic aggregates, theory of production and of the firm, international economic relations and labor problems. Prerequisite: Econ. 203.

**311. Money and Banking. (3-0). Credit 3. I, II, S**

Fundamental principles of money, credit, and banking and their exemplification in modern currency and banking history. Prerequisite: Econ. 204.

**318. Economics of Labor. (3-0). Credit 3. I, II**

Special attention given to labor force, unemployment, labor markets, wages, work periods, aged worker, industrial accidents, and phases of social security. Prerequisite: Econ. 204.

**319. Economic Development of the United States. (3-0). Credit 3. II**

Economic development of U. S. from colonial times to present. Prerequisite: Econ. 203.

**320. Economic Development of Europe. (3-0). Credit 3. II**

Development of wage system, expansion of markets, Industrial Revolution, and relation of industrial development to political policy. Prerequisite: Econ. 203.

**321. International Trade and Finance. (3-0). Credit 3. I**

Theory of international trade, foreign exchange, and balance of payments; tariffs, exchange controls, and other barriers to trade. Prerequisite: Econ. 204.

**323. Economic Analysis. (3-0). Credit 3. I, II**

Role of prices in directing production and distributing income under both competitive and monopolistic market situations. Prerequisite: Econ. 204.

**324. Comparative Economic Systems. (3-0). Credit 3. I**

Study of economic systems of leading nations. Prerequisite: Econ. 203.

**330. Economic Development. (3-0). Credit 3. II**

Basic concepts and problems of economic development in underdeveloped countries. Prerequisite: Approval of Department Head.

**410. Theory of Income and Employment. (3-0). Credit 3. I**

Conceptual problems of measuring national income, organization of national income accounts and determinants of aggregate levels of income, employment and prices. Prerequisite: Econ. 311.

**412. Public Finance. (3-0). Credit 3. I, II, S**

Current federal, state, and local financial practices analyzed with objective of determining appropriate changes in expenditure, tax, debt and budget policies. Prerequisite: Econ. 204.

**424. Economics of Transportation. (3-0). Credit 3. II**

Structure and functioning of highway, rail, water, and air transportation systems. Regulation of transportation industries by governmental agencies. Prerequisite: Econ. 204.

**443. Contemporary Economic Problems. (3-0). Credit 3. II**

Analysis of current problems relating to economic stability, control of monopoly power, income distribution, and international economic relations. Prerequisite: Econ. 204.

**445. Public Policy on Labor Relations. (3-0). Credit 3. II**

Economic and social issues raised by labor legislation. Right to organize and bargain collectively, machinery for adjustment of labor disputes. Prerequisite: Econ. 318.

**FOR GRADUATES****601. History of Economic Thought. (4-0). Credit 4. I**

Survey of the period 1776-1848. Special attention devoted to original works of Smith, Malthus, West, Ricardo and Mill. Prerequisite: Approval of Department Head.

**602. History of Economic Thought. (4-0). Credit 4. II**

Primary emphasis given to emergence of marginal utility theory and analytical system of Alfred Marshall. Prerequisite: Approval of Department Head.

**606. Economics of Labor. (4-0). Credit 4. II**

Survey of theories of labor movement followed by analysis of wage and employment theories, effect of union policies and practices upon wages and employment, and role of unionism in economic stability. Prerequisite: Econ. 318.

**607. Contemporary Economic Theory. (4-0). Credit 4. I**

Survey of more important contributions to economic thought made during last generation. Current writings of important contemporary economists are read and evaluated. Prerequisite: Econ. 323.

**611. National Income Analysis. (4-0). Credit 4. I**

Development of modern static national income analysis from general equilibrium system. Roles of fiscal and monetary policy in promoting economic stability are examined. Prerequisite: Econ. 410.

**613. International Economic Policies. (3-0). Credit 3. II**

Critical examination of governmental policies toward international trade. Export and import controls, exchange controls, tariff and rehabilitation policies in relation to foreign trade. Prerequisite: Econ. 321.

**615. The American Economy, I. (3-0). Credit 3. I**

Brief historical survey of growth of capitalist institutions. Analysis of market system with particular reference to behavior of both individual and firm. Study of fluctuations in level of economics activity and macro analytical tools required for understanding causes of such fluctuations. Prerequisites: Graduate classification; approval of Department Head.

**616. The American Economy, II. (3-0). Credit 3. II**

Policy course which entails application of micro and/or macro analytical tools to the following problem areas: public finance, international trade and finance, capital markets, labor markets, and social control of business. Prerequisite: Econ. 615.

**685. Problems. Credit 1 to 3 each semester. I, II, S**

Individual problems not related to thesis or dissertation. Prerequisites: Graduate classification with major or minor in economics; approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Thesis research.

### **Department of Education and Psychology**

Professors Hensarling (Head), Parker, Parry, Varvel; Associate Professors Barker, Casey, Kerley, Robinson; Assistant Professors Elliott, Graves, Harrell, Hope, McCandless, McDowell, Randall, Stokes

#### **EDUCATION**

**101. Improvement of Learning. (1-3). Credit 2. I, II, S**

Principles of effective learning as applied to specific college subjects. Developed through lectures, assigned readings, use of teaching machines and programmed materials.

**105. The World of Work. (0-2). Credit 1. I, II**

Designed to familiarize student who has not decided upon a vocational goal with demands, required skills, and rewards of various occupational areas. Each student will be given an opportunity for studying his aptitudes and interests and relating them to various vocational requirements.

**106. Survey of Man's Knowledge. (0-2). Credit 1. II**

Survey course designed to acquaint student with the various schools of thought and the many areas of knowledge which comprise our culture. Such disciplines as philosophy, social and physical sciences, religion, law, and literature will be investigated.

**215. Foundations of American Education. (3-0). Credit 3. I**

Facts and concepts essential for understanding of American education. Presents sociological, historical, and philosophical development of education as part of American culture and civilization.

**351. Reading and Language Arts in the Elementary School. (3-0). Credit 3. II**

Fundamentals of teaching of reading in elementary school. Development of effective techniques used in teaching of oral and written communication, listening skill, functional grammar, handwriting, and spelling to elementary pupils. Prerequisites: Junior or senior classification; approval of Department Head.

**352. Mathematics in the Elementary School. (3-0). Credit 3. II**

Introduction to understanding of modern mathematics. Emphasis given to integration of content, history, and application of discovering techniques, using problem solving approach. Developing an understanding of four fundamental procedures, structure, measurement, sets, fraction, and communication of important mathematical concepts to elementary children. Prerequisites: Junior or senior classification; approval of Department Head.

**353. Social Studies in the Elementary School. (3-0). Credit 3. I**

Studies involving basic human needs, social processes, customs, value systems, and social problems. Content is drawn from history, geography, civics, economics, anthropology and sociology, to broaden children's understanding of people and societal organizations. Prerequisites: Junior or senior classification; approval of Department Head.

**354. Science in the Elementary School. (3-0). Credit 3. I**

Designed to help elementary teacher understand basic concepts of science and scientific methods. Content relates to natural phenomena involving physical, chemical, and biological processes. Elementary student's appreciation and interest in science are emphasized. Prerequisites: Junior or senior classification; approval of Department Head.

**421. History and Philosophy of Education. (3-0). Credit 3. I, II, S**

Evaluation of educational achievements of various nations and people of western world; development of social, religious, political, and cultural beliefs and attitudes that underlie American education today.



**423. Principles and Practices of Teaching. (3-0). Credit 3. I, II, S**

Designed for teachers. Planning and directing learning activities; instructional media; classroom management; techniques of communication of subject matter; observation of public school classes; evaluation and marking. Prerequisite: Senior classification in teacher education.

**425. Supervised Student Teaching. (2-12). Credit 6. I, II**

Observation and participation in classroom activities. Techniques of teaching student's special subjects. Two hours per week devoted to student's problems. Preparation of units of work preparatory to teaching. Supervised teaching. Prerequisites: Educ. 423; approval of Department Head.

**426. Tests and Measurements. (3-0). Credit 3. II, S**

Development of scientific measurement. Fundamental principles of sound measurement. Methods of appraising achievements of instructional objectives. Primary emphasis upon methods of constructing teacher-made objective tests and techniques for improving other types of written examinations.

**427. Principles of Guidance. (3-0). Credit 3. I, S**

Introduction to field of guidance and student personnel work. Treatment of principles underlying aims, methods, and instruments employed in counseling and guidance. Attention to relationship of instruction and guidance. Prerequisite: Psy. 301 or course in general psychology.

**439. Educational Statistics. (3-0). Credit 3. I, II, S**

Statistical concepts and techniques and their application in behavioral sciences. Not open to students who have credit for any other course in statistics.

**443. Elementary School Curriculum. (3-0). Credit 3. I, S**

Study of organization of elementary content areas. Examination of elementary school instructional purposes and organizational patterns designed to meet them.

**444. Secondary School Curriculum. (3-0). Credit 3. I, II, S**

Inquiry into current curriculum practices and their backgrounds, basis for curriculum reorganization, emphasis upon resource unit approach within modified curriculum structure.

**451. Physical Science for Elementary School Teachers. (3-0). Credit 3. I, II, S**

Study of physical science concepts applicable to elementary school science program. Special emphasis given to subject matter program planning, demonstrations, projects, and observations. Prerequisites: Senior classification; approval of Department Head.

**FOR GRADUATES****601. College Teaching. (3-0). Credit 3. I, S**

Conceptions of higher education underlying typical programs including general education, learning process, and effective use of techniques and instrumentalities of classroom instruction.

**603. Organization and Administration of the Elementary School. (3-0). Credit 3. I, S**

Organization concepts for instruction; assignment and evaluation of staff and grouping patterns of pupils; personnel and plant administration. Prerequisites: Twelve hours of education; approval of Department Head.

**606. Secondary School Administration and Supervision. (3-0). Credit 3. I, S**

Functional study of the secondary school. Administration and supervision of personnel. Pupil accounting. Observations and field studies. Designed to meet needs of secondary school principals, supervisors, and superintendents. Prerequisite: Twelve hours of education.

**607. Programs and Procedures in Supervision. (3-0). Credit 3. II, S**

Designed for teachers, supervisors, and administrators. Philosophy, organization, and administration of supervision of both elementary and secondary schools. It is suggested that Educ. 639 precede this course.

**608. School Finance and Business Management. (3-0). Credit 3. S**

Study of school funds on local, state, and federal level; budgeting, data processing; other systems of accounting, and reporting. Supply management as related to school efficiency. Maintenance of buildings, grounds, and equipment.

**609. Public School Laws. (3-0). Credit 3. S**

Constitutional provisions, statutory laws, court decisions, and regulations governing public schools, with special reference to Texas and federal relationships.

**613. The School Plant. (3-0). Credit 3. S**

Study of plans for determining extent and character of present and future building and equipment needs of school unit; efficiency of present plant; operation and maintenance; planning building program.

**615. Structural Organization and Administration. (3-0). Credit 3. II, S**

Organization and administration of systems of schools and their relationships on federal, state, intermediate, and local levels. Also private, parochial, and adult education.

**616. Administration of Staff Personnel. (3-0). Credit 3. I, S**

Analysis of personnel organization and administration in school systems. Relationship of positions. Ethics, welfare, security, and professional improvement.

**623. Standardized Tests and Measurements. (3-0). Credit 3. I, S**

Principles of psychological testing. Uses and critical evaluation of tests of achievement, intelligence, aptitude, and personality.

**624. Individual Testing. (2-3). Credit 3. II, S**

Practicum in administration and interpretation of Stanford-Binet and Wechsler-Bellevue intelligence tests. Introduction to individual tests of personality. Prerequisite: Educ. 623 or registration therein.

**629. Practicum in Counseling and Guidance. (2-3). Credit 3. I, II**

Supervised practice in individual counseling and group guidance. Cases assigned in Counseling and Testing Center and local public schools. Prerequisites: Educ. 624, 631 or registration therein.

**631. Techniques of Counseling. (3-0). Credit 3. I, S**

Methods of gathering, analyzing, and interpreting case data in counseling. Analysis of dynamics of counselor-counsee relationship. Interviewing techniques. Use of test results in counseling. Prerequisites: Educ. 427 or 635, 623; Psy. 634 or registration therein.

**632. Educational and Occupational Information. (3-0). Credit 3. II, S**

Sources, classification, and analysis of educational and occupational information. Occupational trends, local occupational surveys. Use of occupational information by classroom teacher and guidance specialist.

**633. Methods of Group Guidance. (3-0). Credit 3. II, S**

Methods and practices in group guidance. Homeroom, classroom, and school clubs as opportunities for guidance. Prerequisite: Educ. 427 or 635.

**635. Organization and Administration of Pupil Personnel Services. (3-0). Credit 3. I, S**

Designed to help administrators, counselors, supervisors, and teachers develop an understanding of role of pupil personnel services; responsibility for techniques of evaluating program of pupil personnel services.

**637. Advanced Elementary School Methods. (3-0). Credit 3. II, S**

Study of teaching methods, devices, and techniques of learning-teaching situations on elementary school level. Prerequisite: Twelve hours in elementary education or an elementary school certificate.

**638. Trends in Curriculum and Instruction. (3-0). Credit 3. I, II, S**

Recent research and development in theories and practices of curriculum and instruction. Special attention given to programmed subject content and new instructional media. Prerequisite: Approval of Department Head.

**639. Processes in Educational Leadership. (3-0). Credit 3. I, S**

Analysis of skills and techniques of administrator in modern school, with emphasis on democratic leadership, teacher-administrator relationships, group processes, and evaluation of administrative programs.

**640. School-Community Relationships. (3-0). Credit 3. S**

Systems of interpretation of schools to community publics. Promotion of effective school-community relations through media of communication.

**646. Internship for the School Principal. (0-9). Credit 3. I, II**

Designed to give prospective school principal on-the-job training under guidance of successful, experienced, practicing public school administrator and supervision of member of University staff. Certification requirement for principalship unless waived by Department Head.

**647. Internship for the School Superintendent. (0-9). Credit 3. I, II**

Designed to give prospective school superintendent on-the-job training under guidance of successful, experienced, practicing public school superintendent and supervision of member of University staff. Certification requirement for superintendency unless waived by Department Head.

**648. Internship for the School Business Administrator. (0-9). Credit 3. I, II**

Internship designed to give prospective school business administrator on-the-job training under guidance of successful, experienced, practicing public school administrator and supervision of members of University staff. Prerequisite: Approval of Department Head.

**651. Orientation in Business Principles and Procedures. (3-0). Credit 3. I, S**

Interdisciplinary survey course utilizing various fields in business to broaden knowledge of school superintendent and school business official. Case studies. Field studies. Prerequisite: Master's degree or approval of Department Head.

**652. Educational-Governmental Relationships. (3-0). Credit 3. II, S**

Interdisciplinary survey course utilizing various fields in political science, comparative government, American and state history. Interrelationships of educational administration to political organizations. Prerequisites: Master's degree; approval of Department Head.

**653. The Nature and Problems of Administrative Behavior. (3-0). Credit 3. I, S**

Interdisciplinary survey course utilizing case study method. Designed to enhance understanding and improve techniques in decision making, communication, and personnel relations. Field studies, problems, and experiences. Prerequisites: Master's degree; approval of Department Head.

**681. Seminar. (1-0). Credit 1. I, S**

Problems pertinent to superintendent, principal, counselor, supervisor, and teacher. Recent developments and research in different areas. Prerequisites: twelve hours of advanced education; approval of Department Head.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Directed individual study of selected problem in field of education. Prerequisite: Graduate classification in education.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis.

## PSYCHOLOGY

**207. General Psychology. (3-0). Credit 3. I, II, S**

Introductory course dealing with elementary principles of human behavior. Designed especially for those students majoring in social or biological sciences, pre-medicine, or education. Credit cannot be obtained for both Psy. 207 and 303.

**301. Educational Psychology. (3-0). Credit 3. I, II, S**

Application of psychology to problems of teaching. Nature and operation of laws of learning; transfer of training; nature, measurement, and significance of individual difference; conditions influencing efficiency of learning.

**302. Psychology for Secondary School Teachers. (3-9). Credit 3. I, II, S**

Basic course in educational psychology with special consideration given to guiding development and learning of adolescents. Not available to students with credit for Psy. 301 or 323. Satisfies psychology requirements of eighteen-hour minimum certification program.



**303. Psychology for Technical Students. (3-0). Credit 3. I, II, S**

Introductory course emphasizing applications of general psychology. Designed for students in agriculture, business administration, and engineering. Credit cannot be obtained for both Psy. 207 and 303.

**305. Personality Adjustments. (3-0). Credit 3. I**

Emphasis upon adjustment problems of normal people. Principles of mental hygiene in relation to family, school, and community life. Prerequisite: Psy. 207, or 301, or 303.

**307. Child Growth and Development. (3-0). Credit 3. II, S**

Growth and development of normal child from infancy to adolescence with emphasis on elementary school years. Prerequisite: Psy. 207, or 301, or 303.

**309. Differential Psychology. (3-0). Credit 3. I**

Individual and group differences essential to evaluation of test results and behavior. Distribution and extent, causative factors, trait organization. Prerequisite: Psy. 207 or 303 or advanced classification in engineering.

**311. Comparative Psychology. (3-0). Credit 3. I**

Survey of problems, principles, and methods of animal psychology with emphasis on animal learning, motivation, discriminative processes and abnormal, social, and instinctual behaviors. Prerequisites: Biol. 107 or 108; Psy. 207 or 303.

**319. Systematic Psychology. (3-0). Credit 3. II**

A description and analysis of contemporary schools, theories and viewpoints in psychology. Prerequisites: Six hours of psychology; advanced classification.

**323. Psychology of Adolescence. (3-0). Credit 3. I, II, S**

Psychological problems of normal teen-age individual, including consideration of ways and means of aiding youth to meet these problems constructively. Prerequisite: Psy. 207, or 301, or 303.

**401. Industrial Psychology. (3-0). Credit 3. I, II, S**

Individual differences and their evaluation. Employee dynamics, counseling, communication, training. Job analysis, job evaluation, objective factors in performance. Prerequisites: Psy. 207 or 303, or advanced classification in industrial engineering or technology.

**403. Dynamics of Human Behavior. (3-0). Credit 3. II, S**

Development and integration of personality. Theories of personality. Motivation and adjustment mechanisms. Maladjustment and its sources. Prerequisites: Introductory psychology; Psy. 305 or graduate classification in education or sociology.

**406. Psychology of Learning. (3-0). Credit 3. I**

Survey of significant concepts, experimental methods, and principles of learning. Prerequisite: Psy. 207, or 301, or 303.

**408. Experimental Psychology. (2-3). Credit 3. II**

Applications of experimental method to psychology. Principles and techniques in areas of reaction time, simple motor phenomena, sensation, perception, learning, and social interaction. Prerequisite: Psy. 406 or advanced classification in industrial engineering.

**485. Problems. Credit 1 to 3. I, II, S**

Directed readings or research problems in selected areas designed to supplement existing course offerings. Individual report required. Prerequisites: Junior or senior classification; approval of Department Head.

**FOR GRADUATES****634. Principles of Human Development. (3-0). Credit 3. I, II, S**

Biological, psychological, and cultural interrelationships in human development. Emphasis upon principles and methods as illustrated in research and theoretical contributions. Experiences in procedures of child study. Prerequisite: Graduate classification.

**636. Techniques of Research. (3-0). Credit 3. I, II, S**

Fundamental concepts and tools of research applied to psychological and educational problems. Rationale of research, analysis of problems, library skills, sampling, appraisal instruments, statistical description and inference, writing the research report, and representative research designs.

### Department of Electrical Engineering

Professors Denison, German, Hallmark (Head), Haupt; Associate Professors Barnard, Druce, Rekoff; Assistant Professor Worley; Instructors Beasley, Burkes, Dickerson, Gorman, Jones, Langston, Liles, Meeks, Ray, Vines, Whatley

**201. Electricity and Magnetism. (3-4). Credit 4. I, II, S**

Lectures, recitations, and problems in electricity and magnetism. Laboratory investigation of phenomena studied in textbook. Prerequisite: Math. 307 or registration therein.

**214. Electrical Circuit Theory. (3-3). Credit 4. I, II, S**

Introduction to electrical circuit theory. Complex numbers, phasor algebra, and response of single mesh and series-parallel circuits. Resonance phenomena and poles and zeroes of impedance and admittance are defined. Prerequisites: E.E. 201; Math. 308 or registration therein.

**305. Electrical Circuits and Machines. (3-3). Credit 4. I, II, S**

Study of fundamental principles of electrical circuits, electronic circuits, machines, and control devices. Practice designed to familiarize general engineering student with test procedures for and characteristics of both direct and alternating current machines. Prerequisites: Math. 122 or 210; Phys. 219.

**307. Electrical Circuits. (3-3). Credit 4. I, II, S**

Study of fundamental principles of direct and alternating current circuits, magnetic circuits, and transformers. Practice includes measurement of circuit phenomena. Prerequisites: Math. 122 or 210; Phys. 219.

**308. Electrical Machinery. (2-3). Credit 3. I, II, S**

Study of principal types of electrical machines and servomechanisms, including their characteristics, applications, and control devices. Practice includes actual operation and testing of electrical machinery and equipment most commonly used in industry. Prerequisite: E.E. 307.

**322. Electric and Magnetic Fields. (3-0). Credit 3. II, S**

Application of vector analysis to theory of electric and magnetic fields. Maxwell's equations used to study propagation and reflection of electromagnetic waves. Prerequisites: E.E. 214; Math. 308.

**323. Electrical Circuit Theory. (3-0). Credit 3. I, II**

General circuit analysis and theorems for lumped constant passive circuits. Steady state and transient response studied by classical methods and by behavior of impedance and admittance functions in complex frequency plane. Prerequisites: E.E. 214; Math. 308.

**324. Electrical Circuit Theory. (3-0). Credit 3. II, S**

Continuation of study of lumped constant passive circuits, including transform methods of analysis, two terminal pair networks and three-phase circuits. Prerequisites: E.E. 323; Math. 308.

**325. Electronics. (3-0). Credit 3. I, II**

Introduction to properties of materials necessary to understand principles of semiconductor devices and electron tubes. Both graphical and analytical studies of transistor amplifiers are presented. Prerequisites: Registration in E.E. 323; Phys. 220.

**326. Electronic Circuits. (3-0). Credit 3. II, S**

Study of basic circuits used in communication, instrumentation, and electronic systems. Subjects include frequency response of amplifiers, tuned amplifiers, large signal amplifiers, and feedback in amplifiers. Prerequisites: E.E. 325, registration in 324.

**327. Electrical Laboratory. (1-3). Credit 2. I, II**

Studies of precision and accuracy of measurement. Electronic instrumentation and applications to passive and active networks. Prerequisites: E.E. 323, 325 or registration therein.

**328. Electrical Laboratory. (1-3). Credit 2. II, S**

Studies of precision and accuracy of measurement, electronic instrumentation and applications to passive and active networks. Prerequisites: E.E. 324, 326, 330 or registration in these courses.

**330. Electrical Machinery. (3-0). Credit 3. I, II, S**

Introduction to energy conversion concepts and devices with detailed study of DC machines. Prerequisites: E.E. 324, 328 or registration therein.

**331. Theory and Application of Electron Devices. (3-3). Credit 4. I, S**

For students other than electrical engineering majors. Study of theory of operation and characteristics of electronic devices and circuits with emphasis on instrumentation and control. Prerequisite: E.E. 305 or 307.

**401. Electrical Machinery. (3-0). Credit 3. I, II**

Graphical and mathematical study of electrical machines, including transformers. Prerequisites: E.E. 324, 330, and registration in 403.

**402. Electromechanical Energy Conversion. (3-0). Credit 3. II**

Advanced study of electromechanical energy conversion phenomena. Topics covered fall in general area of generalized machine theory, electromechanical transducers, and advanced analysis of specialized machines. Prerequisites: E.E. 401, 403.

**403. Electrical Laboratory. (0-6). Credit 2. I, II**

Laboratory study of electrical machines covered in E.E. 401. Prerequisites: E.E. 328, registration in 401.

**404. Electrical Laboratory. (0-6). Credit 2. II, S**

Laboratory course devoted to individual design projects based on material covered in prerequisite courses. Prerequisites: E.E. 401, 403, 439, registration in 420.

**415. Transmission Networks. (2-2). Credit 3. I**

Analytical study of theory of transmission lines and impedance matching devices. Hyperbolic-function treatment generalized to apply to power, electronic, and communication circuits. Laboratory will consist of group problems and demonstrations. Prerequisite: E.E. 324.

**420. Servomechanisms and Control Devices. (3-0). Credit 3. II, S**

General study of closed-loop control devices, including electrical, hydraulic and mechanical systems. Prerequisites: E.E. 307 or 323; Math. 308.

**428. Communications Circuits. (2-3). Credit 3. I**

Study of principles used in communications, including telephone and telegraph systems, transmission theory, inductive interference, networks, filters, loading, repeater and carrier systems. Prerequisite: E.E. 439 or registration therein.

**432. Economic Phases of Engineering. (2-0). Credit 2. II**

Problems in mathematics of finance, depreciation, engineering economy, accounting, distribution factors, and rates with particular reference to electric power industry. Prerequisite: E.E. 401 or registration therein.

**439. Electronic Systems. (3-0). Credit 3. I, II**

Study of design of circuits used in communication, instrumentation, and electronic systems. Subjects include oscillator circuits, amplitude, phase, and frequency modulation and demodulation. Prerequisites: E.E. 324, 326, 328.

**448. Principles of Digital Computers. (2-3). Credit 3. II**

Number systems, Boolean algebra applied to digital computer components, analysis and synthesis of sequential devices, digital computer memories, input and output devices, arithmetic units, and overall logical control or computing systems. Prerequisite: E.E. 326 or 331.



**451. Applied Electromagnetic Theory. (3-0). Credit 3. I**

Static boundary value problems; conformal transformation; Schwartz transformation; rectangular harmonics; cylindrical harmonics; spherical harmonics; Maxwell's equations applied to antennas; radiation; fields and power calculations; antenna impedances. Prerequisites: E.E. 322; Math. 308.

**452. Ultra High Frequency Techniques. (2-3). Credit 3. II**

Introduction to theory and practice of ultra high frequency radio wave generation, transmission, and radiation. Development of Maxwell's equations and their application to transmission of electrical energy in wave guides. Prerequisites: E.E. 322, 326.

**454. Advanced Electronic Circuits. (3-0). Credit 3. II**

Study of electronic circuits used for pulsing, counting, computing, and regulating and as wide band amplifiers. Transistor and tube elements. Laboratory will consist of measurements on typical devices. Prerequisite: E.E. 439 or registration therein.

**456. Communication Theory. (3-0). Credit 3. II**

Introduction to processing and transmission of information with emphasis on mathematics and block diagrams of systems. Elements of information theory, effects of signal-noise ratio, methods of modulation and demodulation. Prerequisite: E.E. 439.

**457. Principles of Analog Computers. (2-3). Credit 3. I**

Organization and internal operation of analog and digital computers; function integration, addition, multiplication, and generation; analog system simulation. Prerequisite: E.E. 439 or registration therein.

**459. Electric Power Systems I. (2-2). Credit 3. I**

General considerations in transmission and distribution of electrical energy as related to power systems. Calculation of electric transmission line constants and load flow studies. General theory of symmetrical components. Prerequisite: E.E. 324.

**460. Electric Power Systems II. (2-2). Credit 3. II**

Study of electric power systems during fault conditions by applications of method of symmetrical components. Power system transient stability studies. Economic system loading and automatic load flow control. Prerequisite: E.E. 459.

**461. Electronic Instrumentation. (2-3). Credit 3. I**

A course for students who are not electrical engineering majors that is devoted to applications of electronic instruments to research problems in field of measurements and control systems. Prerequisites: Math. 308, Phys. 219.

**485. Problems. Credit 1 to 3 each semester. I, II, S**

Problems of limited scope approved on individual basis intended to promote independent study. Results of study will be presented in writing, and an oral presentation to staff and students will be required. Prerequisites: Senior classification; approval of Department Head.

**FOR GRADUATES****601\*. Linear Network Analysis. (3-0). Credit 3. I, S**

Fourier and Laplace transform methods of analysis applied to linear networks having periodic, transient, or random excitation.

**602. Nonlinear Network Analysis. (3-0). Credit 3. II**

Analysis and application of nonlinear electrical and electronic systems. Introduction to stability and phase plane analysis.

**605\*. Linear Servomechanisms. (3-3). Credit 4. I, S**

Continuation of E.E. 420 to include advanced topics which will extend study of analytic methods as applied to linear systems and introduce concepts related to linear systems synthesis. Prerequisite: E.E. 420.

**606. Nonlinear Servomechanisms. (3-0). Credit 3. II**

Study of techniques available to analyze nonlinear systems and discontinuous systems, and a study of associated synthesis procedures. Prerequisite: E.E. 605.

\*In the summer session these courses may be divided into two parts, a and b, each with two hours of credit.

**607. Alternating Current Circuits and Machines. (3-4). Credit 4. I**

Study of transient conditions in electrical machines.

**611. Symmetrical Components Applied to Electrical Engineering. (3-4). Credit 4. I**

Solution of unbalanced electrical circuits by means of symmetrical components; study and measurements of machine constants by means of oscillograph.

**624. Electronic Circuits for Instrumentation and Computation. (3-3). Credit 4. II**

Analysis and design of electronic circuits used in instrumentation and computation. Amplifiers, "and" circuits, "or" circuits, and "gate" circuits. Problems of drift compensation in DC amplifiers and closed-loop stability in multi-stage amplifiers treated in detail. Prerequisites: E.E. 326, 448, 457.

**628. Linear System Theory. (3-0). Credit 3. II**

Study of regeneration and feedback theory with emphasis on circuit design methods suitable for treatment of these topics. Prerequisites: E.E. 601; Math. 601 or equivalent.

**629. System Engineering. (3-0). Credit 3. I**

Study of processes of systems engineering, a discipline concerned with planning, organization, and management of programs for developing large, highly complex systems. Prerequisite: E.E. 605 or approval of instructor.

**636. Network Synthesis. (4-0). Credit 4. I**

Synthesis of electrical networks having arbitrarily specified terminal characteristics. Realizability conditions, realization of general two-terminal and four-terminal networks, and approximation of network specifications. Prerequisites: E.E. 601; Math. 601.

**637. Wave Guides and Cavities. (3-0). Credit 3. I**

Application of Maxwell's equations to solution of guided electromagnetic fields. Studies in skin effect, parallel plane wave guides, rectangular wave guides, circular wave guides, cavities, and microwave networks. Prerequisite: E.E. 451.

**638. Antennas and Propagation. (3-0). Credit 3. II**

Application of Maxwell's equations to determine electromagnetic fields of antennas. Studies in radiation, directional arrays, impedance characteristics, aperture antennas, propagation in free space, and propagation through ionosphere. Prerequisite: E.E. 451.

**642. Transistors. (3-3). Credit 4. I, S**

Theory of junction triodes; voltage, current, power and frequency limitations. Small signal parameters and equivalent circuits for transistors; analysis of design of circuits at both small and large signal levels. Prerequisite: E.E. 326.

**644. Sampled Data Servomechanisms. (3-0). Credit 3. II**

Study of techniques for analysis of sampled data and discrete data servo systems and associated synthesis procedures. Prerequisite: E.E. 605.

**646. Statistical Communication Theory. (3-0). Credit 3. II**

Generalized harmonic analysis of deterministic and random signals; elements of probability and statistics; detection of signals in noise; sampling theory; optimum linear systems. Prerequisites: E.E. 601; Math. 601.

**648. Electromagnetic Wave Propagation. (3-0). Credit 3. II**

Study of electromagnetic surface waves; direct and ground-reflected space waves; tropospheric refraction, reflection, and scattering; ionospheric refraction, reflection, and scattering; propagation via meteor trails and whistlers; space communication. Prerequisite: E.E. 451.

**653. Electronic Computer Design. (3-3). Credit 4. I, S**

Function generation and system simulation for analog solution of differential equations, simulation techniques applied to control systems; advanced study of digital adders, subtractors, accumulators, multipliers, and dividers; digital error-detection; digital control. Prerequisites: E.E. 448, 457.

**685. Problems. Credit 1 to 4 each semester. I, II**

Research problems of limited scope designed primarily to develop research technique.

**691. Research. Credit 1 or more each semester. I, II**

Research for thesis or dissertation.

### Department of Engineering Graphics

Professors Cleland, Cronk (Head), McGuire, Oliver, Ransdell, Stark; Associate Professors Earle, Mason; Assistant Professor Bardell; Instructor Guerard

**105. Engineering Graphics. (0-6). Credit 2. I, II, S**

Geometry of graphical construction, projection drawings, revolutions, auxiliaries, sections and conventions, sketching, pictorials, dimensioning, fastenings, engineering drawings, graphical design. Required for beginning engineering students.

**106. Descriptive Geometry. (0-6). Credit 2. I, II, S**

Theory of points, lines, and planes in space; primary and successive auxiliary views, revolutions, engineering problems. Graphical analysis and design problems. Required for beginning engineering students. Prerequisite: E.G. 105.

**127. Industrial Freehand Sketching. (1-3). Credit 2. II**

Basic techniques of freehand drawing in line and tone; delineation of form, textures and materials, sketching, shades and shadows, perspectives, and industrial applications of freehand drawing.

**128. Methods of Industrial Reproduction. (0-2). Credit 1. II**

Basic techniques of reproduction processes for industrial use and study of current processes used in industry.

**209. Nomography. (2-0). Credit 2. II, S**

Application of engineering graphics for presentation of engineering and scientific data and for solution of problems encountered in many phases of engineering and science. Prerequisites: E.G. 106; Math. 121 or equivalent.

**221. Building Construction Drawing. (1-3). Credit 2. II**

Architectural details in frame and masonry construction; general drawings and techniques of presentation; development of construction plans and details. Prerequisite: E.G. 105 or equivalent.

**403. Graphical Computation Devices. (1-3). Credit 2. II, S**

Theory and principles for construction of graphical computation devices; applications to the solution of engineering and technical problems. Prerequisite: E.G. 209 or equivalent.

### FOR GRADUATES

**601. Advanced Industrial Drawing. (2-3). Credit 3. I, S**

For high school and college teachers. Problems pertinent to all industrial fields. Research and visual aids development. Study of current industrial graphical practices. Prerequisites: E.G. 106, 127 or equivalent.

**603. Advanced Machine Drawing. (1-6). Credit 3. II, S**

For high school and college teachers. Conventional practices, pictorial sketches, dimensioning. Visual aids development, creative design, analysis and synthesis, machine components. Prerequisite: E.G. 106 or equivalent.

**605. Spherical Projections.\* (2-0). Credit 2. II, S**

Graphical cartography, spherical projections and industrial applications, great circles, rhumb lines, and other global projections, and geodesic domes. Designed for advancement of teacher and industrial designer. Prerequisite: E.G. 106 or equivalent.

**606. Stereographic and Clinographic Projections.\* (2-0). Credit 2. I, S**

Research and experimentation with stereographic (3 dimensional) photography and drawing as applied to industry and teaching. Development of audio-visual presentations and teaching aids. Graphical investigation of perspectives, and related systems. Prerequisite: E.G. 106 or equivalent.

\*Primarily for graduate students interested in education. Not available for major or minor work toward an engineering degree, except by permission of the Dean of the Graduate College.



**607. Descriptive Geometry for Teachers.\* (4-0). Credit 4. I, S**

Research of early and current applications of descriptive geometry to technical problems. Research and study of new principles for advancement and improvement of teachers of current graphics curricula. Prerequisites: E.G. 106; I.Ed. 323 or equivalent.

**611. Technical Illustration.\* (3-3). Credit 4. II, S**

Axonometric projection — isometric, dimetric, trimetric; and pseudo representations, oblique, pseudo-obliques, and perspectives. Commercial and technical illustrating—airbrush, pencil rendering, ink delineations, and other methods. Prerequisite: E.G. 601 or equivalent.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Special research problems to fit needs of individual student. Prerequisites: E.G. 106; I.Ed. 323; graduate classification; approval of instructor.

## Department of English

Professors Abbott, Anderson (Head), Ballinger, Ekfelt, Hays, Hierth, Laverty, Martin, Morgan, Stokes; Associate Professors Barzak, Bennett, Elmquist, Hauer, Hunter, Kidd, Kroitor; Assistant Professors Archer, Cox, Creswell, Crittenden, Esten, Guinn, Huggett, Jernigan, Keel, Mattern, Peirce, Schatte, Schrader, Shepperd, Wienen; Instructors Harlan, Kell, Rodewald

## ENGLISH

**100. English for Foreign Students. (3-0). Credit 3. II, S**

Speaking and writing for students whose native language is not English. Students entering course are expected to have studied English and to be able to communicate in English. No degree credit granted for satisfactory completion of this course. (See also entry for Course 100 under Department of Modern Languages.)

**103. Composition and Rhetoric. (3-0). Credit 3. I, II, S**

Composition of short papers, with emphasis on sentence structure, paragraph development, and paper organization. Analysis of expository prose.

**104. Composition and Rhetoric. (3-0). Credit 3. I, II, S**

Continuation of Engl. 103. More complex methods of paper development; investigative papers. Readings in prose. Prerequisite: Engl. 103 or advanced standing.

**203. Introduction to Literature. (3-0). Credit 3. I, II, S**

Readings in following types: plays, stories, novels, and poems, chiefly modern. Papers on readings. Prerequisite: Engl. 104.

**210. Argumentation. (3-0). Credit 3. I, II, S**

Principles of argument and their application in reading and writing. Prerequisite: Engl. 104.

**212. Shakespeare. (3-0). Credit 3. I, II, S**

Study of major plays of Shakespeare, with lectures on his art, his language, and his cultural environment. Prerequisite: Engl. 104.

**231. Survey of English Literature. (3-0). Credit 3. I, II, S**

Literature of England from Anglo-Saxon times to late eighteenth century. Prerequisite: Engl. 104.

**232. Survey of English Literature. (3-0). Credit 3. I, II, S**

Continuation of Engl. 231. Literature of England from mid-eighteenth century to twentieth century. Prerequisite: Engl. 104.

**301. Writing for Professional Men. (3-0). Credit 3. I, II, S**

Advanced writing in scientific and technical fields; technical reports and papers; business correspondence. Prerequisite: Completion of freshman-sophomore English program.

\*Primarily for graduate students interested in education. Not available for major or minor work toward an engineering degree, except by permission of the Dean of the Graduate College.

**315. Seventeenth Century Literature. (3-0). Credit 3. I, S**

Period course in English poetry and prose of seventeenth century, not including Shakespeare. Prerequisites: Two courses in sophomore English.

**316. Eighteenth Century Literature. (3-0). Credit 3. II, S**

Period course in English poetry and prose of eighteenth century: Dryden to Blake. Prerequisites: Two courses in sophomore English.

**321. Nineteenth Century Literature (Romantic). (3-0). Credit 3. I, S**

Period course in English poetry and relevant prose of Romantic Movement. Prerequisites: Two courses in sophomore English.

**322. Nineteenth Century Literature (Victorian). (3-0). Credit 3. II, S**

Period course in English poetry and relevant prose of major Victorian authors. Prerequisites: Two courses in sophomore English.

**325. Creative Writing. (3-0). Credit 3. I**

Writing of short stories, poetry, plays, and feature articles. Limited to students who have made an average of C or higher in prerequisite courses. Prerequisites: Two courses in sophomore English.

**327. American Literature to 1870. (3-0). Credit 3. I**

American literature from Colonial Period through Civil War. Prerequisite: Two courses in sophomore English.

**328. American Literature from 1870 to 1920. (3-0). Credit 3. II**

American literature from Whitman to Frost. Prerequisites: Two courses in sophomore English.

**329. Folklore and Folk Songs. (3-0). Credit 3. II**

Elements of folklore: beliefs, folktales, folk medicine, arts and crafts; American and regional folklore; ballads and folk songs. Individual collecting. Prerequisite: Engl. 104.

**334. Science in Literature. (3-0). Credit 3. II**

Main developments in history of science as presented in literature of Western World. Prerequisites: Two courses in sophomore English. (Offered in 1966-67 and in alternate years thereafter.)

**336. Life and Literature of the Southwest. (3-0). Credit 3. II**

Culture of Southwest as expressed in literature. Prerequisite: A course in sophomore English. (Offered in 1966-67 and in alternate years thereafter.)

**340. Modern Drama. (3-0). Credit 3. II, S**

Representative European and American plays from Ibsen to mid-twentieth century. Prerequisites: Two courses in sophomore English. (Offered in 1966-67 and in alternate years thereafter.)

**341. Advanced Composition. (3-0). Credit 3. II**

Study of pattern and style in effective prose through analysis and writing of expository, descriptive, and argumentative essays of length and maturity expected of junior students. Emphasis on developing personal writing techniques suited to diverse fields of specialization. Prerequisites: Completion of freshman-sophomore English program or approval of instructor.

**350. Modern Literature. (3-0). Credit 3. I**

British and American novelists, poets, and dramatists from about 1920 to the present, with lectures on social and intellectual background. Prerequisites: Two courses in sophomore English. (Offered in 1966-67 and in alternate years thereafter.)

**371. Great Books. (3-0). Credit 3. I, S**

Typical works: The Book of Job, Sophocles' Theban plays, Roman lives (from Plutarch), Chaucer's *The Canterbury Tales*, Shakespeare's *Antony and Cleopatra*, Voltaire's *Candide*, Melville's *Moby Dick*, Tolstoy's *Anna Karenina*, MacLeish's *J. B.* Prerequisite: Completion of sophomore program in English.

**372. Great Books. (3-0). Credit 3. II, S**

Typical works: Homer's *Iliad*, Vergil's *Aeneid*, Dante's *Inferno*, Cervantes' *Don Quixote*, Marlowe's *Doctor Faustus*, Goethe's *Faust* (Part I), Dostoyevsky's *Crime and Punishment*, James' *The Turn of the Screw*. Prerequisite: Completion of sophomore program in English.

**375. Nineteenth Century American Novel. (3-0). Credit 3. I**

Representative novels of nineteenth century; lectures. Prerequisite: One course in sophomore English. (Offered in 1965-66 and in alternate years thereafter.)

**376. Twentieth Century American Novel. (3-0). Credit 3. II**

Representative novels of twentieth century; lectures. Prerequisite: Completion of sophomore program in English. (Offered in 1966-67 and in alternate years thereafter.)

**409. Introduction to Linguistics. (3-0). Credit 3. I**

Study of nature of language and of modern linguistic science, including phonetics and phonemics. Prerequisite: Two courses in sophomore English.

**410. History of the English Language. (3-0). Credit 3. II**

Survey of history of grammar, vocabulary, and sounds of English language, with brief discussion of related languages. Prerequisites: Two courses in sophomore English.

**412. Shakespeare. (3-0). Credit 3. II**

Analysis of plays, texts, language, dramatic theory; Shakespearean criticism and scholarship. Prerequisite: Engl. 212 or six hours of advanced literature courses.

**417. English Drama to 1642. (3-0). Credit 3. II**

Significant plays, excluding Shakespeare, from mystery cycles and moralities to closing of theaters. Prerequisite: Engl. 212 or six hours of advanced literature courses. (Offered in 1965-66 and in alternate years thereafter.)

**426. Nineteenth Century English Prose. (3-0). Credit 3. I**

Non-fiction prose of such representative writers as Lamb, Hazlitt, Macaulay, Carlyle, Ruskin, Arnold, Mill, Shaw. Prerequisites: Six hours of advanced literature courses. (Offered in 1965-66 and in alternate years thereafter.)

**427. The English Novel to 1870. (3-0). Credit 3. I**

The novel from Richardson and Fielding to George Eliot; eight to ten representative works; lectures, papers. Prerequisites: Two courses in sophomore English. (Offered in 1966-67 and in alternate years thereafter.)

**428. The English Novel, 1870 to Present. (3-0). Credit 3. I**

The novel from George Eliot to early twentieth century; eight to ten representative works; lectures, papers. Prerequisites: Two courses in sophomore English. (Offered in 1965-66 and in alternate years thereafter.)

**431. Chaucer. (3-0). Credit 3. I**

Poetry, language, literary forms, and social institutions of pre-Renaissance period as seen in Chaucer's works. Prerequisite: Engl. 231 or six hours of advanced literature courses.

**461. Teaching of Language and Composition. (3-0). Credit 3. I, S**

Points of view toward language study; problems in teaching composition; practice in assigning, writing, grading, and criticizing short and long papers. Prerequisite: Senior classification or approval of instructor.

**463. History and Theory of Literary Criticism. (3-0). Credit 3. II, S**

Analysis of major works of literary theorists from Aristotle to present; trends and values in criticism. Prerequisites: Six hours of advanced literature courses. (Offered in 1965-66 and in alternate years thereafter.)

**485. Problems. Credit 1 to 3. I, II, S**

Readings for specific needs of major or minor in English; individual supervision; no class meetings; written reports. Prerequisites: Eighteen hours of English; approval of Department Head.



## FOR GRADUATES

**613. Studies in the Renaissance. (3-0). Credit 3. I**

Poetry, prose, and drama of English Renaissance, exclusive of Shakespeare. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**614. Studies in the Renaissance: Non-Dramatic Literature. (3-0). Credit 3. II, S**

Major writers of non-dramatic prose and poetry of English Renaissance: Wyatt, Surrey, Sidney, Spenser, Marlowe, Raleigh, Shakespeare, Drayton, Jonson, and Donne. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**615. Seventeenth Century English Literature. (3-0). Credit 3. I, II, S**

Poetry and prose of chief writers of seventeenth century: Bacon, Donne, Jonson, Herrick, Milton, and Dryden. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**616. Studies in the Eighteenth Century. The Age of Pope. (3-0). Credit 3. I**

Poetry and prose to 1750, concentrating on Defoe, Addison, Swift, Pope, Thomson, and Young, with emphasis on aesthetic, scientific, and religious ideas. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**617. Studies in the Eighteenth Century: The Age of Johnson. (3-0). Credit 3. II, S**

Prose, including the novel, in latter half of century, concentrating on Fielding, Johnson, Boswell, Goldsmith, Sheridan, Hume, and Gibbon, with emphasis on aesthetic, scientific, and philosophic ideas. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**633. Studies in the Nineteenth Century: The Romantic Age. (3-0). Credit 3. I**

Romantic writers, along with literary, religious, and scientific issues of century. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**634. Studies in the Nineteenth Century: The Victorian Age. (3-0). Credit 3. II, S**

Prose and poetry from Carlyle to Shaw. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**649. Studies in the Twentieth Century: British Literature. (3-0). Credit 3. I**

Selected authors since 1900: Yeats, Joyce, Huxley, and others. Emphasis upon development of particular literary movement or literary form. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**650. Studies in the Twentieth Century: American Literature. (3-0). Credit 3. II**

Selected authors since 1900: Robinson, Frost, Eliot, Lewis, Faulkner, Hemingway, and others. Emphasis on particular literary movement or literary form. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**661. Analysis of Composition. (3-0). Credit 3. I, II, S**

Principles of organization — sentence, paragraph, development of paper; rhetorical analysis of expository writing; diction; writing and assigning compositions; teaching techniques.

**662. Analysis of the English Language. (3-0). Credit 3. I, II, S**

Linguistic and historical development of English; linguistic theory, change, phonology, grammar. English usage — linguistic geography, social and functional variations. Application to teaching language, literature, and composition.

**663. Analysis of Literature. (3-0). Credit 3. I, II, S**

Characteristics of literature — meaning, imagery and symbolism, point of view, structure. Types of literature — poetry, plays, novel, short story. Literary criticism — principles and application.

**674. Studies in American Literature: The Age of Transcendentalism. (3-0). Credit 3. I, S**

Backgrounds of Transcendentalism in Europe; the movement in the U. S.; works of Emerson, Hawthorne, Poe, Whitman, Melville, Thoreau, and others. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**675. Studies in American Literature: The Gilded Age. (3-0). Credit 3. II**

Social and literary backgrounds of Gilded Age; emergence of American humor and realism, and their development in Mark Twain and early Henry James. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Special readings designed to supplement student's knowledge of English and American literature in areas which he has not studied in other courses. Research papers. Prerequisites: Graduate classification; approval of Department Head.

**691. Research. Credit 1 to 4. I, II, S**

Research for thesis. Prerequisites: Graduate classification; approval of Department Head.

**SPEECH****343. Discussion and Debate. (3-0). Credit 3. I**

Techniques of discussion and debate, including participation in various kinds of discussions, analysis of a debate proposition, building of debate file, preparation of a brief, and practice in debating.

**403. Public Speaking. (3-0). Credit 3. I, II, S**

Speech training for technical students. Speeches of social and technical interest, demonstration talks, book reviews, group discussions, and parliamentary procedure. Prerequisite: Completion of sophomore program in English. (Students may not receive credit for both Spch. 403 and 407.)

**407. Oral Interpretation. (3-0). Credit 3. II**

Instruction and practice in the art of oral interpretation; poetry, fiction, and drama. (Students may not receive credit for both Spch. 407 and 403.) Prerequisite: Completion of sophomore program in English.

**THEATER ARTS****378. Techniques of Acting. (3-0). Credit 3. I**

Instruction and practice in fundamentals. Voice and diction, stage movement, character analysis and development, and styles of acting. Prerequisite: Sophomore classification or approval of instructor.

**380. History of the Theater. (3-0). Credit 3. I**

Survey of theater from beginning to present. Prerequisite: Completion of sophomore program in English or approval of instructor.

**381. Introduction to Theater. (2-3). Credit 3. I**

Plays from point of view of director, actor, technician. Prerequisite: Sophomore classification or approval of instructor.

**382. Technical Theater. (2-3). Credit 3. II**

Methods of staging plays — scene design, construction, stage lighting. Prerequisite: Completion of sophomore program in English.

**383. Techniques of Directing. (3-0). Credit 3. II**

For beginning directors; theories of directing; participation in scheduled plays. Prerequisites: Th.A. 381, 382.

**Department of Entomology**

Professors Adkisson, Gaines (Head); Associate Professors Burke, Hanna, Price, Randolph; Assistant Professors Dorough, Schaffner, Van Cleave

**201. General Entomology. (2-2). Credit 3. I, II, S**

Study of principal orders of insects; relation of anatomy and physiology of insects to control methods; principal insecticides and their uses; development, habits, and economic importance of more common insects with control methods for injurious species.

**208. Veterinary Entomology. (2-3). Credit 3. I, II**

Study of insects and other arthropods that are parasitic upon domestic animals concerned primarily in transmission of diseases. Methods of eradication and control emphasized. Prerequisite: First year veterinary medicine or sophomore animal science classification.

**301. Systematic Entomology. (2-3). Credit 3. I**

Systematic study of orders and families of insects, and distinguishing characteristics of representative species. Preparation of insect collections and use of keys for identification emphasized in practice. Prerequisite: Ento. 201 or equivalent.

**302. Systematic Entomology. (2-3). Credit 3. II**

Continuation of Ento. 301, including orders and families of insects not studied in Ento. 301. Prerequisite: Ento. 301.

**305. Insect Morphology. (2-3). Credit 3. I**

General morphology of typical insects with special emphasis on those structures of particular importance in systematic and applied entomology. Prerequisite: Ento. 201 or equivalent.

**306. Insect Physiology. (2-3). Credit 3. II**

Internal anatomy and principles of physiology as applied to insects. Prerequisite: Ento. 305.

**313. Biology of Insects. (2-3). Credit 3. I**

Emphasis placed on orders and important families of Hexapoda, their marks of identification, general biology, and their relations to other animals. Identification of insects and other arthropods stressed in laboratory. Prerequisite: Three hours of biological sciences.

**401. Principles of Insect Control. (2-3). Credit 3. I**

Study of both applied and natural controls emphasizing uses, practical application, and physical and chemical properties of more important insecticides. Prerequisite: Ento. 201.

**402. General Economic Entomology. (2-3). Credit 3. II**

Nature of injury, life history, habits and control of common insects attacking stored products, cereal, forage, cotton, ornamentals, fruits, vegetables, man, household, and livestock. Practical methods of insect control are demonstrated in laboratory. Prerequisite: Ento. 201.

**405. Horticultural Pests. (2-2). Credit 3. II**

Biologies, types of damage, and recognition of pests of fruit, nut, truck crops, and ornamental plants considered. Approved insecticidal, biological, and natural control measures are studied. Prerequisite: Ento. 201 or equivalent.

**423. Medical Entomology. (2-3). Credit 3. I**

Study of biology, disease transmission or causation, and control of arthropods that are parasitic on or in man. Taxonomy of medically important arthropods stressed in laboratory. Prerequisite: Ento. 305 or equivalent.

**424. Insect Ecology. (2-3). Credit 3. II**

Effect of environmental factors upon distribution, abundance, competition, and ecological succession of insects. Prerequisite: Ento. 302 or equivalent.

**485. Problems. Credit 1 to 4. I, II, S**

Individual problems for beginners in research. Prerequisite: Approval of Department Head.

**FOR GRADUATES****601, 602. Systematic Entomology. (3-3). Credit 4 each semester. I, II**

Taxonomic study of orders and families, including genera and species of class Hexapoda; study of International Rules of Nomenclature. Special study of some particular group of insects required in practice. Prerequisite: Ento. 302.

**607. Economic Entomology. (3-3). Credit 4. I, S**

Designed primarily for workers in Vocational Agriculture and Extension Service. Biologies, economic importance, and control of agricultural pests are stressed. Insecticides and methods of application. Prerequisite: Approval of Department Head.



**608. Economic Entomology. (3-3). Credit 4. II**

Detailed study of insect pests, including identification, distribution, principles, and methods of natural, cultural, and chemical controls. Literature and research methods stressed. Prerequisite: Ento. 401 or 402.

**613, 614. Morphology. (3-3). Credit 4 each semester. I, II**

Detailed study of anatomical structures of insects. Prerequisite: Ento. 305.

**615. Insect Physiology. (3-3). Credit 4. I**

Study of physiology of respiration, circulation, digestion, and excretion; mechanical and chemical senses of insects are considered. Prerequisite: Ento. 306 or equivalent.

**617, 618. Medical and Veterinary Entomology. (3-3). Credit 4 each semester. I, II**

Taxonomy and biology of parasitic insects, ticks, mites and their role in causation and transmission of diseases affecting man and domestic animals. Prerequisite: Ento. 208 or equivalent.

**619. Insect Toxicology. (3-3). Credit 4. II**

Chemical compounds which possess toxic properties; actions of poisons on insects; evaluation of insecticides in laboratory and field; mathematical analysis of data. Prerequisite: Ento. 615.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Entomological problems not pertaining to thesis or dissertation. Prerequisites: Graduate classification with major or minor in entomology; approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Research problems on taxonomy, life histories, biological control, ecology, and physiology of insects, and toxicology of insecticides. Prerequisite: Graduate classification.

## Department of Finance

Professor Stevenson; Associate Professor Cherry (Head); Assistant Professors Mitchell, Van Ingen

**310. Credit Management. (3-0). Credit 3. II**

Elements of mercantile and consumer credit; organization of credit department; sources of credit information; collection tools and procedures.

**315. Insurance. (3-0). Credit 3. I, II, S**

Introduction to theory and practice of insurance, including life, fire, automobile, and personal and business risk. Prerequisite: Sophomore classification.

**320. Life Insurance. (3-0). Credit 3. I**

Fundamentals of life insurance and annuities; rate-making, reserves, cash surrender values, dividends, and selection of risks. Prerequisite: Fin. 315.

**322. Property Insurance. (3-0). Credit 3. I**

Principles and practices of property insurance, including fire and allied lines, consequential losses, transportation insurance, multiple-line, and rate-making. Prerequisite: Fin. 315.

**324. Casualty Insurance and Suretyship. (3-0). Credit 3. II**

Principles of casualty insurance and surety bonding; employer's liability insurance; liability risks; theft, disability, aviation, glass, power plant, and credit insurance. Prerequisite: Fin. 315.

**341. Corporation Finance. (3-0). Credit 3. I, II, S**

Financial practices and financial management of modern business corporation, including cash flow, planning, procurement of funds, management of long-term and working capital. Prerequisite: Econ. 203.

**345. Money and Capital Markets. (3-0). Credit 3. II**

A study of the role of finance and financial institutions in the Money and Capital Markets in the U. S., including supply of and demand for funds, interest rates, and flow of funds analysis. Prerequisite: Econ. 311.

**420. Principles of Investment. (3-0). Credit 3. I, II, S**

Investment media and risks; elements of security analysis; determining investment needs and policy; management of portfolio. Prerequisite: Fin. 341.

**426. The Stock Market. (3-0). Credit 3. I**

Functions and work of organized exchanges, trading practices and mechanics, role of securities dealer and broker, and securities regulation. Prerequisite: Junior classification or approval of instructor.

**427. Insurance Law. (3-0). Credit 3. II**

Law cases on insurance; insurance policies and legal interpretation; technical legal pitfalls; case examples from all forms of insurance coverage; Texas insurance law. Prerequisite: Mgmt. 211.

**428. Real Estate Titles and Conveyances. (3-0). Credit 3. I, II, S**

Ownership and transfer of titles to real property, including deeds, easements, zoning, building codes and private restrictions; mortgages and liens, building contracts. Prerequisite: Mgmt. 211.

**432. Security Analysis. (3-0). Credit 3. II**

Methods of analyzing individual security issues; financial statement analysis; rights and interests of investors. Prerequisite: Fin. 420.

**434. Problems in Finance. (3-0). Credit 3. II**

Financial problems confronting management of large and small businesses. Case system is used relating legal, accounting, and financial aspects of each situation. Prerequisite: Fin. 341.

**437. Applied Life Insurance. (3-0). Credit 3. II**

Legal and social aspects of life insurance; problems of reinsurance, company organization, and financial position; government life insurance; uses of settlement options. Prerequisite: Fin. 320.

**438. Commercial Banking. (3-0). Credit 3. II**

A survey of management problems and operating characteristics of the commercial bank, including organization, risks, audit and control, liquidity, loan policy, and investment policy. Prerequisite: Econ. 311, senior classification, or approval of instructor.

**440. Real Estate Fundamentals. (3-0). Credit 3. I**

Basic factors and agencies in modern real estate development; historic, economic, legal, and social aspects of real estate; appraisal, financing, and agency management.

**454. Law of Private Corporations. (3-0). Credit 3. I, II**

Powers and limitations of corporate form of business organization; legal problems in management of corporation; rights of stockholders and creditors. Prerequisite: Mgmt. 212.

**466. Mortgage Lending. (3-0). Credit 3. I**

A study of the operating characteristics of mortgage lending institutions, the mortgage market, types of loans, loan servicing and procedures in the housing and home finance industry. Prerequisite: Junior classification or approval of instructor.

**485. Problems. Credit 1 to 3 each semester. I, II, S**

Directed study on selected problems in the area of Finance not covered in other courses. Prerequisites: Senior classification; approval of Department Head.

**FOR GRADUATES****630. Problems of Corporation Finance. (3-0). Credit 3. II**

Financial problems of corporation are analyzed, including current financing, re-funding operations, dividend policies, and corporate reorganization. Prerequisite: Fin. 341.

**652. Financial Management. (3-0). Credit 3. II**

Financial policies and practices in business firm; finance function, financial control and organization; financial analysis and planning. Prerequisites: Graduate classification; approval of graduate advisor.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Critical examination of subject matter presented in current periodicals, recent monographs and bulletins in field of finance.

**685. Problems. Credit 1 to 3 each semester. I, II, S**

Directed study on selected problems using recent developments in business research methods. Prerequisites: Graduate classification; approval of instructor.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis.

## **Department of Geology and Geography**

Professors Blank, Parker (Acting Head), Schroeder, Smith, Schlesselman; Associate Professors Doran, Koenig, Seward

### **GEOGRAPHY SECTION**

**201. World Regional Geography. (3-0). Credit 3. I, II**

Study of differences in physical and cultural environment over earth's surface, with emphasis on changes in landscape created by man.

**203. Physical Geography. (3-3). Credit 4. I, II**

Systematic description and interpretation of natural phenomena on face of earth.

**204. Economic Geography. (3-0). Credit 3. I, II**

Study of commercial regions of world, dealing with production types or occupations, such as grazing, plantation farming, grain farming, fishing, lumbering, mining, and manufacturing.

**302. Geography of Europe. (3-0). Credit 3. II**

Geographical survey of Europe as a whole and of individual countries.

**303. Geography of South America. (3-0). Credit 3. I**

Investigations of trade opportunities in South America. Economic activities of major geographic regions as reflecting present day utilization of natural resources. Possibilities of future development.

**304. Geography of South and East Asia. (3-0). Credit 3. II**

Geographic characteristics of Monsoon Asia. Topical discussions of such factors as physical landscape, cultural succession, and economies, followed by consideration of sub-regions.

**320. Geography of the Pacific Basin. (3-0). Credit 3. I**

Geographic aspects of Pacific Ocean area. Physical characteristics, native peoples, discovery and exploration, political and economic factors; regional studies of sub-areas.

**401. International Political Geography. (3-0). Credit 3. I**

Study of some of present social and political problems of world powers and also weaker nations. Effort to find geographic factors back of these problems and possible geographic adjustments.

**430. Cartography. (2-3). Credit 3. II**

Introduction to map making: history of maps and aerial photographs, projections, map lettering, compilation, design. Use of symbols. Prerequisite: Math. 102.

**440. History and Nature of Geography. (3-0). Credit 3. I**

Summary of classical knowledge of world, followed by sketch of geographic exploration to present. Emphasis on development of thought on nature of geography from 1800 to present.

**485. Problems. Credit 1 to 4. I, II**

Individually supervised research or advanced study on restricted areas not covered in regular courses. Prerequisite: Approval of Department Head.



## FOR GRADUATES

**601. Economic Geography. (4-0). Credit 4. I**

Regional survey of world distribution of major agricultural and industrial commodities with particular attention to causal action of natural, social, and economic factors. (Offered in 1965-66 and in alternate years thereafter.)

## GEOLOGY SECTION

**201. General Geology. (3-0). Credit 3. I, II**

Agents and processes that have produced surface features of earth and structure of earth's crust. Prerequisites: Chem. 101 or 103 or equivalent; registration in Geol. 203 or 207; registration in Geol. 209 for majors in geology, geophysics, and geological engineering.

**203. Crystallography and Mineralogy. (2-6). Credit 4. I**

Crystallography and descriptive mineralogy. Sight recognition of crystal forms and of common minerals. Prerequisites: Chem. 102 or 104; E.G. 106; Math. 102, 103.

**204. Mineralogy and Rock Study. (1-3). Credit 2. II, S**

Continuation of Geol. 203. Recognition and classification of common rocks by their megascopic characteristics. Prerequisite: Geol. 203.

**205. Elementary Geology. (3-3). Credit 4. I, II, S**

General principles of physical geology, physiography, geologic processes, and introduction to historical geology. Laboratory work on common minerals, rocks, and maps. Primarily for liberal arts students.

**206. Elementary Historical Geology. (3-3). Credit 4. I, II**

Introduction to historical geology, including review of hypotheses of earth's origin, significance of fossils, origin and character of selected geologic formations, and development of North American continent. Prerequisite: Geol. 201, or 205, or 320.

**207. Mineralogy and Rock Study. (2-6). Credit 4. I**

Identification of common minerals and rocks by means of their physical properties. Study of well cuttings and cores. Should be taken simultaneously with Geol. 201. Designed for petroleum engineers. Prerequisites: Chem. 102 or 104; Math. 103 or equivalent.

**209. Introduction to Field Work. (0-3). Credit 1. I**

One-half day each week studying geologic processes. Scientific methods of field work stressed. Should be taken concurrently with Geol. 201 and cannot be taken for credit after credit is received for Geol. 210.

**210. Historical Geology. (3-3). Credit 4. II, S**

Principles of stratigraphy and paleontology, physical and organic record of earth's history, hypotheses of earth's origin. Prerequisites: Chem. 102 or 104; E.G. 106; Geol. 201 and 203, or 201 and 207, or 205 and approval of Department Head; Math. 102, 103.

**300. Field Geology. Credit 6. S**

Geologic mapping in selected areas in Llano Uplift and Marathon Basin. Written report. Prerequisites: C.E. 208; Geol. 204, 312, 317.

**303. Petrography and Petrology. (2-3). Credit 3. I**

Principles of optical mineralogy; identification of minerals in fragments and thin sections by use of petrographic microscope; thin section study of igneous rocks, and their classification. Prerequisite: Geol. 204.

**304. Sedimentary Petrography. (2-3). Credit 3. II**

Microscopic study of sedimentary and metamorphic rocks in thin sections; heavy mineral analysis; description, origin, and classification of sedimentary and metamorphic rocks. Prerequisite: Geol. 303.

**305. Invertebrate Paleontology. (3-3). Credit 4. I**

Morphology, classification, and geologic range of principal invertebrate groups. Prerequisite: Geol. 210.

**306. Stratigraphy. (3-3). Credit 4. II**

Stratigraphic studies of United States with emphasis on Gulf Coastal Plain formations and their correlation by means of invertebrate fossils. Laboratory studies consist of stratigraphic principles and changing faunas through geologic time. Prerequisite: Geol. 305.

**312. Structural Geology. (2-3). Credit 3. II**

Interpretation of rock structures; their relation to stratigraphic, physiographic, and economic problems. Prerequisites: Geol. 201, 204 or 207, 210.

**315. Principles of Sedimentation. (2-3). Credit 3. I**

Origin, transportation, and deposition of sediments; products resulting from sedimentary processes; structures, textures, and colors of sediments. Laboratory work in collecting and sampling, methods of analyzing and presenting data. Prerequisites: Geol. 201, 204, 210.

**317. Stratigraphic Paleontology. (0-3). Credit 1. II**

Laboratory studies of changes in faunas throughout geologic time. Prerequisite: Geol. 305.

**320. Geology for Civil Engineers. (2-3). Credit 3. I, II**

Principles of dynamic and structural geology and study of common minerals and rocks with their relationships and applications to construction, foundations, and excavation. Prerequisite: Sophomore classification in civil engineering.

**404. Geology of Petroleum. (2-3). Credit 3. I**

Origin, migration, and accumulation of petroleum. Typical United States oil and gas fields. Laboratory work in subsurface geology. Prerequisites: Geol. 300, 312.

**406. Economic Geology. (3-0). Credit 3. I**

Application of principles of geology, chemistry, and physics to formation of useful minerals and rocks and general survey of such deposits. Prerequisites: Geol. 300, 312.

**409. Geology of Non-Metallics Other than Petroleum. (3-0). Credit 3. II**

Mineralogy, stratigraphic, and structural relations, origin, geographic distribution, uses, and economics of non-metallic mineral deposits other than petroleum. Prerequisites: Geol. 300, 312.

**422. Natural Structural Materials. (2-3). Credit 3. II**

Building stones and stone products, with special emphasis on clays and clay products, their qualities, occurrences, uses, and processes of fabrication and manufacture. For students registered in architecture or engineering. Prerequisite: Junior classification.

**423. Micropaleontology. (1-6). Credit 3. II**

Systematic survey of important groups of micro-fauna with particular emphasis on their classification and use. Prerequisite: Geol. 305

**425. Subsurface Geology. (2-3). Credit 3. II**

Study of well cuttings and cores; electrical, radioactive, drilling time, and caliper logs. Preparation of subsurface contour maps and cross sections. Prerequisites: Geol. 404; approval of Department Head.

**427. Stratigraphy. (3-0). Credit 3. II**

Stratigraphy of North America with emphasis on principles of stratigraphy. Prerequisite: Geol. 210.

**431. Geomorphology. (2-3). Credit 3. I**

Principles and fundamentals of geomorphology. Laboratory work in advanced map interpretation. Prerequisites: Geol. 300, 312.

**433. Field Geology. (0-6). Credit 2. II**

Two full afternoons per week devoted to acquirement of techniques of field geology in areas adjacent to campus. Prerequisite: Geol. 300.

**441. Advanced Engineering Geology. (3-3). Credit 4. I**

Survey of those phases of mineralogy, petrology, historical geology, structural geology, and sedimentation that may be applied to engineering problems. Not available to geology or petroleum engineering majors. Prerequisites: Senior classification; approval of Department Head.

**481. Seminar. (1-0). Credit 1. I**

Review of current literature and technical developments. Discussion of certain legal aspects of petroleum industry. Each student will make both oral and written reports. Prerequisites: Geol. 300, 312.

**482. Seminar. (1-0). Credit 1. II**

Continuation of Geol. 481. Each student will prepare more advanced reports. Prerequisites: Geol. 300, 306, 312.

**485. Problems. Credit 1 to 3. I, II, S**

Advanced problems in geology.

**599. Rocks and Minerals. (2-3). Credit 3. S**

Study of rocks and minerals and megascopic determination by means of their physical properties. Origins of minerals, rocks, and mineral deposits. For secondary school teachers. Prerequisites: Geol. 600; graduate classification; approval of Department Head.

**FOR GRADUATES****600. Earth Science for Secondary School Teachers. (2-3). Credit 3. II, S**

Survey of fundamental principles of physical geology, geologic processes, and earth history including origin and nature of solar system. Designed to aid secondary school instructors in presenting earth sciences. Prerequisites: Graduate classification; approval of Department Head.

**601. Advanced Research Techniques. (1-0). Credit 1. I**

Introduction to modern instrumentation techniques and methods used in geology. Prerequisite: Graduate classification.

**609. Field Geology. Credit 2 to 6. I, II, S**

Systematic geologic surveying of selected areas. Prerequisite: Geol. 300.

**612. Structural Geology. (3-0). Credit 3. I**

Detailed study of geologic structures and consideration of theories regarding earth movements, with selected readings. Prerequisite: Geol. 312.

**616. Micropaleontology. (1-6). Credit 3. I**

Study of microscopic fossils and their uses in correlation. Laboratory work in examination of well samples. Prerequisite: Geol. 423.

**618. Sedimentation. (3-0). Credit 3. II**

Investigation of processes of sedimentation with analytical laboratory work on sedimentary rocks. Seminar. Prerequisite: Geol. 315.

**619. Petroleum Geology. (3-0). Credit 3. II**

Theoretical study of some problems in petroleum geology. Prerequisite: Geol. 404.

**620. Geology of Ground Water. (3-0). Credit 3. I**

Principles of occurrence and movement of water beneath earth's surface, and influence of various geologic situations upon its behavior. Factors applying to estimates of supply. Engineering aspects of ground water.

**622. Stratigraphy. (3-0). Credit 3. I**

Sources and depositional environment of sediments, character and relation of sedimentary strata, and principles involved in delimiting, correlating and naming stratigraphic units.

**625. Advanced Ground Water Geology. (3-0). Credit 3. II**

Seminar course in application of principles of advanced geology to development and use of ground water supplies. Prerequisites: Geol. 620 or equivalent; approval of Department Head.

**627. Structural Geology of Foreign Areas. (2-0). Credit 2. II**

Reading and conference course on available literature dealing with basic geology of areas outside of North America.



**629. Structural Geology of North America. (3-0). Credit 3. II**

Description of important geologic structures of North America and of development of regional structural features in geological times. Prerequisite: Graduate classification.

**631. Geology in Engineering Construction. (3-0). Credit 3. II**

Geologic principles applied to construction of highways, foundations, bridge abutments, and piers, tunnels, dams, reservoirs, etc. Construction materials. Test borings and their interpretation. Prerequisites: Graduate classification; approval of instructor.

**639. Paleozoic and Mesozoic Paleontology. (3-0). Credit 3. I**

Study of important faunas of these eras. Prerequisites: Graduate classification; approval of Department Head.

**640. Cenozoic Paleontology. (3-0). Credit 3. II**

Study of important faunas of this era with emphasis on megafossils of Gulf Coast. Prerequisites: Graduate classification; approval of Department Head.

**643. Paleozoic Stratigraphy. (3-0). Credit 3. II**

Stratigraphy of Paleozoic System with particular emphasis on Paleozoic of West Texas and Oklahoma. Prerequisites: Graduate classification; approval of Department Head.

**644. Mesozoic Stratigraphy. (3-0). Credit 3. II**

Study of stratigraphy of Mesozoic System. Prerequisites: Graduate classification; approval of Department Head.

**645. Cenozoic Stratigraphy. (3-0). Credit 3. II**

Study of Cenozoic System. Prerequisites: Graduate classification; approval of Department Head.

**646. Gulf Coast Stratigraphy. (3-0). Credit 3. II**

Detailed study of Mesozoic and Cenozoic Systems of Gulf Embayment. Prerequisites: Graduate classification; approval of Department Head.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

A course to enable graduate students with major or minor in geology to undertake limited investigations not within their thesis or dissertation research and not covered in established curricula. Prerequisites: Graduate classification; approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Original research on problems in various phases of geology. Research for thesis or dissertation.

## Department of Geophysics

Assistant Professor Fahlquist; Instructor Atwell

**435. Principles of Geophysical Exploration. (3-3). Credit 4. I**

Principles of different methods used in geophysical exploration with emphasis on interpretation of geophysical data and physical properties of rocks. Prerequisites: Geol. 312; Math. 122 or 210; Phys. 219; approval of Department Head for majors in other departments.

**436. Seismic Exploration. (2-3). Credit 3. II**

Study of seismic investigations with artificial sources, including field procedures, instrumentation, and interpretation of data. Prerequisite: Geol. 435.

**446. Physics of the Earth. (3-0). Credit 3. II**

Study of earth's elastic and inelastic behavior; its gravitational, magnetic, electrical and thermal fields; and effect of forces acting within earth. Prerequisites: Geol. 312; Math. 122 or 210; Phys. 219; approval of Department Head for majors in other departments.

**485. Problems. Credit 1 to 3. I, II, S**

Advanced problems in geophysics.

## FOR GRADUATES

**651. Theoretical Seismology. (3-0). Credit 3. I**

Mathematical development of elasticity theory and stress waves in bounded and unbounded solid media. Prerequisites: Geop. 435 or registration therein; Math. 308; approval of Department Head for majors in other departments.

**653. Gravity and Magnetic Methods. (3-0). Credit 3. II**

Study of earth's gravity and magnetic fields; role of gravity in geodesy; methods, instruments, and interpretation of data in gravity and magnetic methods of exploration. Prerequisites: Geop. 435; Math. 308.

**655. Electrical and Radioactivity Methods. (2-0). Credit 2. II**

Study of procedures, instruments, and interpretation of data obtained from electrical, electromagnetic, and radioactivity methods of exploration. Minor emphasis on geothermal and geochemical methods. Prerequisites: Geop. 435; Math. 308 or registration therein.

**657. Earthquake Seismology. (2-0). Credit 2. I**

Study of earthquakes, their causes, effects, method of location, determination of wave paths, interpretation of deep structures; and instruments used for recording. Prerequisite: Geop. 651 or registration therein.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

A course to enable graduate students with major or minor in geophysics to undertake limited investigations not within their thesis or dissertation research and not covered in established curricula. Prerequisites: Graduate classification; approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Original research on problems in various phases of geophysics. Research for thesis or dissertation.

## Department of Health and Physical Education

Professors Adamson, Landiss, Penberthy, Tishler (Head); Associate Professors Andrews, Mamaliga, Palmer, Ponthieux; Assistant Professor Wieder;  
Instructor Fletcher

## HEALTH EDUCATION

**216. First Aid. (0-2). Credit 1. I, II, S**

Prepares students for Red Cross Instructor's First Aid Certificate.

**218. Athletic Injuries. (1-2). Credit 2. II**

Study of conditioning and training of individual and team; care and prevention of injuries. Prerequisite: Biol. 219.

**415. Secondary School Health Education. (3-0). Credit 3. I, S**

Study of health problems; needs of individual; cooperation of home and community; resources for health in community, state, and nation; techniques of evaluation. Prerequisite: Approval of instructor.

**421. Elementary School Health Education. (3-0). Credit 3. II**

Study of modern trends and methods in elementary school health program; survey of materials and agencies and their value to adequate health program. Prerequisite: Approval of instructor.

## FOR GRADUATES

**631. Community and Public Health. (3-0). Credit 3. S**

Community health problems; public health laws; national, state, and local health agencies. Prerequisite: H.E. 415 or 421.

## PHYSICAL EDUCATION

P.E. 101, 102, 201, and 202 are included in all curricula. The purpose of the physical education program is to raise the level of fitness of the student and help him acquire through instruction and practice the fundamental knowledge and skills to meet present and future physical needs.

All students will be classified according to their specific needs and assigned to courses of instruction based on these needs. All students will be administered a swimming test and a physical fitness test. Those students who are unable to pass the swimming test will register for swimming instruction. Students who do not meet the minimum standards of fitness will register for a general conditioning course, while those students who do not meet the optimum standards of fitness will register for instruction in a developmental course. All other students who meet, or surpass, the optimum standards may register for any one of the P.E. 101, 102, 201, and 202 courses. No student may repeat a course unless he has failed it.

Students may elect P.E. 301, 302 for credit of one hour each after having completed the required courses.

101. Required Physical Education. (0-2). No Credit. I, II, S

102. Required Physical Education. (0-2). No Credit. I, II, S

201. Required Physical Education. (0-2). No Credit. I, II, S

202. Required Physical Education. (0-2). No Credit. I, II, S

211. Physical Education Activities. (1-2). Credit 2. I

Instruction and development of skill in physical education activities with emphasis on team type activities other than major sports.

212. Physical Education Activities. (1-2). Credit 2. II

Instruction and development of skill in physical education activities with emphasis on individual and dual type sports.

213. Introduction to Health and Physical Education. (3-0). Credit 3. I, II

History; principles; objectives; current concepts of health, physical education, and recreation.

221. Safety Education. (2-0). Credit 2. I

Home, school, traffic, and general safety.

251. Coaching of Basketball. (1-3). Credit 2. I

Theory and practice of coaching fundamentals in basketball.

255. Coaching of Track. (1-3). Credit 2. I

Theory and practice of coaching fundamentals in track and field events.

301. Physical Education. (0-2). Credit 1. I, II, S

May be elected by students having completed four required semesters of physical education.

302. Physical Education. (0-2). Credit 1. I, II, S

May be elected by students having completed four required semesters of physical education.

310. Pool and Waterfront Management. (3-0). Credit 3. II

Study of sanitary codes and pool sanitation; safety; problems of pool and waterfront management; selection of personnel.

315. Elementary School Physical Education. (3-0). Credit 3. II

Physical education activities, materials, and curriculum in elementary schools. Prerequisite: Junior classification.

316. Secondary School Physical Education. (3-0). Credit 3. I

Physical education activities, materials, and curriculum in secondary schools. Prerequisite: Junior classification.

317. Coaching of Football. (1-2). Credit 2. II

Theory and practice of coaching fundamentals in football.

326. Outdoor Education. (3-0). Credit 3. I, II

History, philosophy, and programs in outdoor education.

423. Administration of Health and Physical Education. (3-0). Credit 3. II, S

Administrative problems involved in coordination of health, physical education, intramural, and athletic areas in comprehensive program of physical education. Prerequisite: Senior classification.



**425. Tests and Measurements. (3-0). Credit 3. I, II, S**

Use, interpretation, evaluation, and administration of existing tests in health and physical education; application of elementary statistical procedures. Prerequisite: Senior classification.

**427. Therapeutic Principles. (3-0). Credit 3. I**

Elementary techniques in diagnosing functional and structural defects; procedures of individual exercise with emphasis on preventive and remedial measures. Prerequisite: Biol. 219.

**428. Corrective Therapy. (3-9). Credit 6. II, S**

A six week clinical course in corrective therapy. Taught at, and in cooperation with, the Veterans Administration Hospital in Houston. Prerequisite: P.E. 427.

**450. Directed Teaching. (2-12). Credit 6. I, II**

Observation and supervised practice teaching in public schools. Prerequisites: P.E. 316; senior classification.

**481. Seminar. (1-0). Credit 1. I, II, S**

Study of professional ethics and current problems relating to health, physical education, and athletics. Prerequisite: Senior classification.

**485. Problems. Credit 1 to 3.**

Special problems in physical education assigned to individual students or to groups.

**FOR GRADUATES****601. Survey of Research. (3-0). Credit 3. S**

Study of published reports and research in field of health and physical education. Prerequisite: Educ. 426 or P.E. 425.

**603. Coaching and Officiating. (3-0). Credit 3. S**

Advanced coaching and officiating techniques in football, basketball, track, and baseball. Prerequisites: Teaching and coaching experience.

**610. Administration of Interschool Athletics. (2-0). Credit 2. II, S**

Designed for school superintendents, principals, and athletic directors. Study of various problems in administration of interschool athletic program.

**614. Philosophy and Principles. (3-0). Credit 3. I, S**

Divergent origins, leaders, conditions, and forces affecting development of health and physical education.

**622. Supervision of Health and Physical Education. (3-0). Credit 3. S**

Principles and processes of supervision; in-service training of personnel. Prerequisite: P.E. 423.

**636. Advanced Tests and Measurements. (3-0). Credit 3. S**

Critical study of tests and measurements; methods of constructing and evaluating tests. Prerequisite: P.E. 425.

**681. Seminar. (1-0). Credit 1. I, II, S**

Discussions of laws, certification, professional ethics, and other current problems relating to health, physical education, and recreation.

**685. Problems. Credit 1 to 3 each semester. I, II, S**

Directed study of selected problems of health, physical education, and recreation not related to thesis.

**Department of History and Government**

Professors Benton, Hall, Lang, Nance (Head), Nelson; Associate Professors Ashcraft, Duncan, Miller, Taylor; Assistant Professors Bayliss, Botner, Langley, Monroe, Woodward; Instructors Anderson, Bahme, Calvert, Cobb, Davis, Heslop, Stephen, Treat

**GOVERNMENT****206. American National Government. (3-0). Credit 3. I, II, S**

Organization, functions, and nature of national government; rights, privileges, and obligations of citizenship; immigration and naturalization laws, all as closely

related to constitution of United States as possible. Prerequisite: Sophomore classification.

**207. State and Local Government. (3-0). Credit 3. I, II, S**

Nature, organization, and general principles of local government in United States with especial attention to these forms of government in Texas. Prerequisite: Govt. 206 or equivalent. Required of all students who have not had at least three semester hours credit in military training.

**308. United States Constitutional Development. (3-0). Credit 3. II**

Study of leading decisions of Supreme Court. Various trends in our constitutional growth since 1789 are treated, as well as expansion through judicial interpretation of powers delegated to national government. Prerequisites: Govt. 206; Hist. 105.

**310. Comparative Government. (3-0). Credit 3. II, S**

Survey of major European governments. Stress placed upon parliamentary democracies of Great Britain, France, West Germany, and Italy. Dictatorships of U.S.S.R. and Spain will also be considered. Prerequisite: Junior classification.

**315. American Political Parties. (3-0). Credit 3. I, S**

Study of organization, history, and functions of political parties, and place they occupy in operation of national, state, and local governments in United States. Prerequisite: Junior classification. (Offered in 1966-67 and in alternate years thereafter.)

**320. Elements of Political Thought. (3-0). Credit 3. II**

Study of ancient, medieval, and modern concepts of government as developed by principal contemporary political writers, and as reflected in political institutions. Prerequisite: Junior classification. (Offered in 1966-67 and in alternate years thereafter.)

**321. Local Government in the United States. (3-0). Credit 3. II**

Development, structure, nature, and legal status of local government pattern; counties, towns, townships, school districts, etc., their relationship to the units of government. Prerequisites: Govt. 206, 207. (Offered in 1965-66 and in alternate years thereafter.)

**325. Introduction to Public Administration. (3-0). Credit 3. I, S**

Survey of American public administration with emphasis upon development of public administration in United States, theories of organization, methods of management, executive leadership, ethics and responsibility. Prerequisites: Govt. 206, 207.

**331. International Politics. (3-0). Credit 3. I, S**

Analysis of contemporary world from point of view of nation-state; political principles, problems, and factors involved in foreign policies, and relations of nations. Prerequisite: Six semester hours of government. (Offered in 1966-67 and in alternate years thereafter.)

**333. International and Regional Organization. (3-0). Credit 3. II**

Historical development of modern world-wide regional international organizations. Politics, structure, and functions of United Nations; economic and political; international federalism. Prerequisites: Govt. 206, 207. (Offered in 1966-67 and in alternate years thereafter.)

**335. Government and Politics of Latin America. (3-0). Credit 3. I**

Constitutional development, political institutions, and contemporary political problems of principal Latin American countries. Prerequisite: Six hours of government. (Offered in 1965-66 and in alternate years thereafter.)

**425. American Political Thought. (3-0). Credit 3. I, S**

Study of ideas that have shaped American political thought from colonial times to present as reflected in their institutions, political writers, statesmen, and other individuals. Prerequisite: Six hours of advanced government or approval of Department Head.

**431. Conduct and Control of American Foreign Relations. (3-0). Credit 3. I, S**

Nature and control of power to conduct foreign relations under Constitution; treaties, agreements, and war. Role of Foreign Service of State Department; nature, structure, and functions of diplomatic and consular services. Prerequisites: Twelve

semester hours of government or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**436. Municipal Government. (3-0). Credit 3. I**

Urban growth; legal position of cities; forms of government; relation of city to state; special reference to Texas cities. Prerequisite: Govt. 206. (Offered in 1966-67 and in alternate years thereafter.)

**438. American Legislative Process. (3-0). Credit 3. I, S**

Analysis of legislative process; powers, structure, organization, political control, and procedure of Congress and state legislatures; other legislative authorities. Prerequisites: Govt. 206, 207. (Offered in 1965-66 and in alternate years thereafter.)

**441. Public Personnel Administration. (3-0). Credit 3. II**

Development of merit system; problems of recruitment and selection; position classification and compensation; promotion, discipline, service ratings; retirement; selected cases in personnel management. Prerequisite: Six semester hours of advanced government.

### FOR GRADUATES

**608. The American Presidency. (3-0). Credit 3. II, S**

The office of President of the United States; its place in the constitutional and political system. Emphasis on modern experience and current problems of the office. Prerequisites: Six hours of advanced government; approval of Department Head.

**611. Government of the Soviet Union and Eastern Europe. (3-0). Credit 3. II, S**

Nature and structure of Soviet political institutions; communist ideology; Russian imperialism and international Communism; the "cold war." Prerequisites: Twelve semester hours of advanced government or equivalent.

**632. International Law. (3-0). Credit 3. I, S**

Nature and sources of international law; recognition; jurisdiction on high seas; rights and immunities of states and persons in foreign courts; law of international claims; law of war and neutrality. Prerequisites: Twelve semester hours of advanced government.

**641. Politics and Administration. (3-0). Credit 3. I, S**

The influence of partisan and pressure group activities in the formation and execution of public policy; case studies of decision making and administrative techniques. Prerequisites: Six hours of advanced government; approval of Department Head.

**685. Problems. Credit 1 to 3. I, II, S**

Individual instruction in selected fields of government. Will stress reports and wide reading in field selected. Prerequisites: Eighteen hours of government and history; graduate classification.

**691. Research. Credit 1 or more each semester. I, II, S**

Thesis research. Credit will be given only upon acceptance of completed thesis. Prerequisites: Twelve hours of advanced government.

### HISTORY

**101. History of Western Civilization to 1500. (3-0). Credit 3. I**

Ancient civilization, Greece and Rome; Christianity; Medieval civilization in West, eastern Europe; emphasis upon political, social, and intellectual developments from earliest human cultures to 1500. Prerequisite: Registration in Honors Program.

**102. History of Western Civilization since 1500. (3-0). Credit 3. II**

Renaissance and Reformation; religious, dynastic, and imperial developments; industrial revolution; western democracies; central and eastern Europe; intellectual revolution; World Wars I and II and after. Prerequisites: Hist. 101 or 217; registration in Honors Program.

**105. History of the United States. (3-0). Credit 3. I, II, S**

English colonization; Revolution; adoption of constitution; growth of nationalism; cotton and slavery problem; war for Southern independence; reconstruction. (See "Requirement in Government and History," page 29.)



**106. History of the United States. (3-0). Credit 3. I, II, S**

Since reconstruction; new social and industrial problems; rise of progressive movement; United States emergence as world power; World War I; reaction and New Deal; World War II; contemporary America. Prerequisite: Hist. 105.

**205. American History, 1492-1875. (3-0). Credit 3. I**

The origins and growth of United States; survey of American social, political, economic development. Prerequisites: Sophomore classification; registration in Honors Program.

**206. American History, 1876 to the Present. (3-0). Credit 3. II**

Survey of social, political, and economic development of United States since 1875. Prerequisites: Hist. 105 or 205; registration in Honors Program.

**213. History of England. (3-0). Credit 3. I, II**

British, Saxon, and Norman origins; national development; struggles between church and state; crown and nobles; nobles and commons; development of parliament. Required in three-year pre-law program.

**214. History of England. (3-0). Credit 3. I, II**

Agrarian and Industrial Revolutions; relations with Ireland; evolution of democracy; struggles with France and Napoleon; social legislation in twentieth century; growth of Empire until World War II. Required in three-year pre-law program. Prerequisite: Hist. 213.

**217. Development of Europe. (3-0). Credit 3. I, II, S**

History of western Europe in Middle Ages. Survey of development of European civilization from decline of Roman Empire to Renaissance. Required of majors in history; student in the Honors Program may substitute Hist. 101.

**218. Development of Europe. (3-0). Credit 3. I, II, S**

History of western Europe from Renaissance to present. Required of majors in history. Prerequisite: Hist. 217 or 101. Students in the Honors Program may substitute Hist. 102.

**302. Colonization of North America. (3-0). Credit 3. II**

Geographic setting; early English, French, Dutch, Swedish discovery, conquest, and settlement, 1497-1763; colonial administration; colonial life; inter-colonial wars. Prerequisite: Twelve hours of history, or six hours of history and at least six hours of sophomore courses in other social sciences.

**315. The United States, 1901 to the Present. (3-0). Credit 3. I, II, S**

Study of United States history during twentieth century with particular emphasis upon domestic matters.

**318. International Developments since 1918. (3-0). Credit 3. I, II, S**

General survey of world politics since close of World War I. Particular attention given to problems and ideologies of great powers of Europe and to those factors and conditions which explain present political tendencies and policies.

**321. Europe, 1815-1870. (3-0). Credit 3. I, S**

Congress of Vienna and reconstruction of Europe; political changes in 1823, 1830, 1848, and 1870; outstanding social, economic, scientific, and cultural developments. Prerequisites: Twelve semester hours of history, or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**322. Europe, 1870-1919. (3-0). Credit 3. II, S**

Political, economic, social, intellectual, and cultural developments in Europe, 1870-1919, with special emphasis upon diplomatic and military developments. Prerequisites: Twelve semester hours of history, or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**325. Trends in American History. (3-0). Credit 3. I, II, S**

Sources and development of leading American institutions constituting representative democracy, their influence upon our nation's development and upon twentieth century world. Required of all students offering only three semester hours in American history toward legal requirement for baccalaureate degree.

**326. History of Texas. (3-0). Credit 3. I, II, S**

History of Texas from Spanish period to present day. Stress placed upon period of Anglo-American settlement, revolution, republic, and development of modern state. Prerequisite: Sophomore classification.

**331. Medieval Civilization. (3-0). Credit 3. I**

History of medieval thought ranging from influence of Plato and Aristotle to age of Erasmus and Machiavelli; intellectual history of Middle Ages, including interests of man in philosophy, science, education, law, and religion. Prerequisite: Six semester hours of history.

**332. Renaissance and Reformation. (3-0). Credit 3. II**

Study of fifteenth and sixteenth centuries with emphasis upon political ideas, art, and humanism of Renaissance. Doctrinal controversy and beliefs of Luther, Calvin, and Zwingli are emphasized. Prerequisite: Six semester hours of history.

**341. South America to 1825. (3-0). Credit 3. I**

Political history of South America from exploration and settlement to independence; colonial institutions; commercial systems. Prerequisites: Twelve semester hours of history, or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**342. South America Since Independence. (3-0). Credit 3. II**

Political history of independent South American nations since independence with emphasis upon ABC countries; economic, social, and cultural development; foreign relations. Prerequisites: Twelve semester hours of history, or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**375. Tudor and Stuart England. (3-0). Credit 3. I, S**

Study of changes in social, economic, political, and religious organization of England from 1485 to 1689; the Interregnum, Restoration, and "Glorious Revolution." Prerequisites: Twelve hours in history, including Hist. 213, 214 or 217, 218. (Offered in 1966-67 and in alternate years thereafter.)

**410. The United States, 1820-1860. (3-0). Credit 3. I, S**

Jacksonian democracy; impact of nationalism and sectionalism; manifest destiny and Mexican War; slavery controversy; expansion. Prerequisite: Six hours of advanced history or approval of Department Head. (Offered in 1965-66 and in alternate years thereafter.)

**411. The Old South. (3-0). Credit 3. I, S**

History of antebellum South; emphasis upon physical bases of Southern regionalism; Southern alignments on national issues; slavery-plantation economy and society of Old South; secession and formation of Confederacy. Prerequisite: Hist. 106 or 325. (Offered in 1966-67 and in alternate years thereafter.)

**412. Civil War and Reconstruction. (3-0). Credit 3. II**

Survey of background and causes of the war; military, political, economic, and diplomatic aspects of the war; life behind the lines; reconstruction and post-war adjustments, 1861-1877. Prerequisite: Twelve hours of history, or equivalent.

**413. Mexico and Spanish North America. 1492-1821. (3-0). Credit 3. I**

Exploration and establishment of Spanish dominion in West Indies, Central America, and Mexico; Spanish colonial system and institutional development; independence movement. Prerequisites: Twelve semester hours of history, or equivalent. (Offered in 1967-68 and in alternate years thereafter.)

**414. History of Mexico, 1821 to the Present. (3-0). Credit 3. II**

Political, economic, and social development of Mexico since independence and her relation to other world powers. Prerequisites: Twelve semester hours of history, or 6 hours of history and junior classification. (Offered in 1967-68 and in alternate years thereafter.)

**415. The Institutional Background of Texas, 1519-1845. (3-0). Credit 3. I, S**

Study of history of Texas from Spanish period to annexation to United States. Particular stress placed upon Spanish and Mexican legal and administrative systems, colonization; revolution, republic, and fight for annexation. (Offered in 1967-68 and in alternate years thereafter.)

**416. Texas Since 1845. (3-0). Credit 3. II, S**

History of Texas since annexation. Careful attention given to social, cultural, economic, and political developments, and to place of Texas in national affairs. (Offered in 1967-68 and in alternate years thereafter.)

**419. Social and Intellectual History of the United States, 1820-1920. (3-0). Credit 3. II**

Century of social and political thought, religion, science, scholarship, and education in United States. Prerequisite: Six hours of advanced history or approval of Department Head. (Offered in 1966-67 and alternate years thereafter.)

**421. Far East, 1895 to Present. (3-0). Credit 3. II**

Survey of government, politics, and civilizations of China, Japan, India, Pakistan, and Southeast Asia since 1895; international developments in Far East; Korean War. Prerequisite: Twelve hours of history, or equivalent. (Offered in 1967-68 and in alternate years thereafter.)

**422. International Rivalry in the Gulf-Caribbean Area, 1840 to the Present. (3-0). Credit 3. I**

Background of Spanish colonial policy, with British, French, and Dutch intrusion; United States interest and policies; Pan-Americanism and Pan-Hispanism. (Offered in 1967-68 and in alternate years thereafter.)

**423. American Foreign Relations. (3-0). Credit 3. I, S**

History of United States' foreign relations and policies since 1868. (Offered in 1966-67 and in alternate years thereafter.)

**424. American Foreign Relations. (3-0). Credit 3. II, S**

History of United States' foreign relations and policies since 1868. (Offered in 1966-67 and in alternate years thereafter.)

**475. Nineteenth Century England. (3-0). Credit 3. II**

Political, social, economic, and intellectual history of England from 1815 to 1914. Prerequisite: Six hours of advanced history or approval of Department Head.

**485. Problems. (3-0). Credit 3. I, II**

Seminar instruction in selected fields of history not covered in depth by other courses. Reports, extensive reading, and comprehensive final examination required. Prerequisites: Superior GPR; 18 hours of history, 6 of which must be advanced; approval of Department Head.

**FOR GRADUATES****603. The United States: Revolutionary Era, 1750-1789. (3-0). Credit 3. I, S**

Structure of American Society; British policy; the revolutionary movement; independence; Confederation period; social, political, and economic changes; diplomatic affairs. Prerequisites: Twelve hours of advanced history; or 18 hours of history, 6 of which must be advanced, and 6 hours of advanced courses in other social sciences; graduate classification.

**604. The United States: Early National Era, 1789-1829. (3-0). Credit 3. II, S**

Organization of the new government; the Federalist system; Jeffersonian democracy; the War of 1812; the New Nationalism, political, social, and economic problems; territorial expansion. Prerequisites: Twelve hours of advanced history; or 18 hours of history, 6 of which must be advanced, and 6 hours of advanced courses in other social sciences; graduate classification.

**609. American Historical Writing. (3-0). Credit 3. I, S**

Survey of American historical writing and historiography from 1607 to present, with some attention to bibliographical guides to sources and literature of United States. Prerequisite: Twelve hours of advanced history or equivalent.

**610. The Trans-Mississippi West. (3-0). Credit 3. II**

Study of the West in American history. Emphasizes political, economic, social, and cultural influences of frontier. Extensive reading required. Prerequisite: Eighteen hours of history and government.

**611. American Leaders. (3-0). Credit 3. II, S**

Personalities and contributions of thirty-six American leaders from Samuel Adams to Dwight Eisenhower. Prerequisite: Twelve hours of advanced history or equivalent.



**612. The French Revolution and Napoleon. (3-0). Credit 3. II**

Detailed consideration of decline of ancient regime, influence of Encyclopedists, causes and course of events during revolution and after; evaluation of source material. Prerequisite: Eighteen hours of history and government. (Offered in 1965-66 and in alternate years thereafter.)

**613. Twentieth Century United States Diplomacy. (3-0). Credit 3. II, S**

United States foreign policies from end of Spanish American War to present, including scope, principles, practices, objectives, dangers, and lessons learned. Prerequisites: Twelve hours of advanced history; or 18 hours of history, 6 of which must be advanced, and 6 hours of advanced courses in other social sciences; graduate classification.

**615. Growth of Spanish Institutions in America, 1492-1857. (3-0). Credit 3. I**

Study of political, economic, religious, military, and related institutions, both in theory and practice, as proposed, developed, and applied in Spanish-American colonies and nations. Prerequisite: Eighteen hours of history and government. (Offered in 1966-67 and in alternate years thereafter.)

**621. The United States, 1877-1914. (3-0). Credit 3. I, S**

Economic, social, political history of the U. S., 1877-1914, emphasizing growth of industrialism, disappearance of the frontier, labor and farm organizations, the growth of American imperialism, and constitutional development. Prerequisites: Twelve hours of advanced history; or 18 hours of history, 6 of which must be advanced courses in other social sciences; graduate classification.

**622. The United States, 1914 to the Present. (3-0). Credit 3. II, S**

The United States during World War I; the "Roaring Twenties," the depression; the New Deal, World War II, and the Cold War. Prerequisites: Twelve hours of advanced history; or 18 hours of history, 6 of which must be advanced, and 6 hours of advanced courses in other social sciences; graduate classification.

**685. Problems. Credit 1 to 3 each semester. I, II, S**

Individual instruction in selected fields of history. Stresses reports and wide reading in field selected. Prerequisite: Eighteen hours of history and government.

**691. Research. Credit 1 or more each semester. I, II, S**

Thesis research. Credit given only upon acceptance of completed thesis. Prerequisite: Twelve hours of advanced history.

## Department of Industrial Education

Professors Glazener, Groneman (Head), Hawkins; Associate Professors Bertrand, Hardeman; Assistant Professor Boone; Instructors Craft, Dennis, Magowan, Zabeik

**105. Woodcraft. (1-5). Credit 3. I, II**

Comprehensive study of woods, wood products, and wood industries; including growth and botanical structure, production and uses, design, construction, and finishing.

**106. Sheet Metal. (1-5). Credit 3. II**

Study of industrial practices in developing, laying-out, and fabricating sheet metal products. Problems involving parallel-line, radial-line, and triangulation.

**107. Industrial Materials and Manufacturing Processes. (2-3). Credit 3. I, II**

Comprehensive study of production, processing, and use of numerous raw materials of industry. Laboratory work consists of problems involving research and experimentation.

**108. Carpentry and Mill Work. (1-6). Credit 3. I, II**

Designed primarily for architectural students. Includes study of various methods of processing and/or fabrication of common materials used in architectural construction. Laboratory assignments consist primarily of design and construction of projects involving wood, metal or plastics.

**109. Cabinet Making. (1-6). Credit 3. II**

Intermediate level course involving design and construction of wood projects such as furniture case goods. Study of characteristics of wood and finishes for wood. Prerequisite: I.Ed. 105 or equivalent.

**204. Development and Practice in Industrial Education. (3-0). Credit 3. II**

History and development of industrial education, its meaning and objectives. Applications of vocational preparation for industry, vocational practices, and developments within industry.

**205. Ornamental Iron. (1-5). Credit 3. I**

Study of metals and metal products; including alloying and proper use of ferrous and non-ferrous metals. Problems involving foundry casting, spinning, machining, forging, welding, tubular construction, and electroplating.

**301. Methods of Teaching and Class Management. (2-0) or (3-0). Credit 2 or 3. I**

Introduction to fundamentals of teaching as applied to industrial subjects; management of class, equipment, and supplies.

**304. Applied Industrial Electricity. (2-3). Credit 3. I, II**

Theoretical and practical study of electrical circuits, motors, generators, transformers, lighting, controls, and instruments. Laboratory experiences consist of experiments and projects in circuits and machines. Prerequisite: Phys. 202.

**308. A Study of Modern Industries. (3-0). Credit 3. I**

Study of political, historical, and geographical factors, including location, machinery, power, raw materials, market, and labor which have direct influence upon development and distribution of industries. Specific studies of individual industries are made, such as iron, steel, paper, automobiles, petroleum, cement, leather, plastics, and textiles.

**310. Course Making. (2-0). Credit 2. II**

Methods of outlining courses of study to meet needs of different types of classes. Each student will make a complete course for some particular subject.

**323. Methods of Teaching Mechanical Drawing. (1-3). Credit 2. I**

Student should have completed course equivalent to E.G. 106 before attempting this course. Analysis of problems and selection of instructional material and methods of presentation for general drafting.

**326. General Metalwork. (1-5). Credit 3. I, II**

Design and construction of power machinery including development of plans for procedure, jigs, and fixtures. Study made of materials, metallurgy industrial processes and procedures of foundry, welding, and machine shop. Prerequisite: M.E. 310.

**327. Industrial Arts Handcraft. (1-5). Credit 3. I**

Development and preparation of instructional materials; designing and building of teaching type projects and problems in such materials as leather, lapidary, and other handcraft activities.

**328. Industrial Accident Prevention. (3-0). Credit 3. I, II**

Analysis of fundamentals of accident prevention and their application to industrial supervision and management. Prerequisite: Junior classification.

**329. Advanced Cabinet Making. (1-6). Credit 3. II**

Advanced cabinet and furniture design, construction, and finishing. Includes development of hand woodworking skills, instruction and practice in maintenance of woodworking equipment. Prerequisite: I.Ed. 109.

**332. Plastic and Ceramics. (1-3). Credit 2. I**

Sources, manufacture, supply, and uses of plastics and ceramic materials; designs appropriate for plastics projects; essential processes in fabrication of plastics and ceramic objects.

**334. Upholstery. (1-3). Credit 2. II**

Instruction in essentials of upholstery processes, including design and construction of frames and foundations. Prerequisite: I.Ed. 105.

**336. Design in the Arts and Crafts. (1-3). Credit 2. II**

Analysis and solution of design problems applicable to arts, crafts, and industrial products as related to industrial education. Prerequisites: E.G. 105, 127; I.Ed. 105, 109; M.E. 309 or equivalent.

**404. Visual Aids for Industrial Subjects. (1-2). Credit 2. I**

Designed to develop understanding of, need for, construction of, and use of visual aids for instruction in industrial subjects. Student activity consists of determining values of color in aids, use of projection and television equipment, and a variety of other audio-visual media.

**406. Industrial Guidance. (2-0). Credit 2. I**

Study of instruments and techniques of industrial guidance, its relation to education and industry, its meaning and purpose, and analysis of methods of investigation and guidance procedures.

**409. Methods of Introducing Industrial Organization and Management into Industrial Schools. (2-0). Credit 2. S**

Management of modern industrial enterprises and possible adaptation to industrial schools.

**419. Laboratory of Industries Methods. (1-3). Credit 2. II**

Study of industries, with particular emphasis on graphic arts. Student experimentation with methods of communicating through media of type, engravings, lithography, and xerography. Laboratory work in plate-making, proofreading, copy-fitting, make-up, fundamentals of layout, and bookbinding.

**420. Follow-Up, Visitations, and Coordination in Part-Time Schools. (2-0). Credit 2. S**

Selecting occupations suitable for young people to learn, placing students in suitable employment on part-time basis, and coordinating their school duties with their work activities.

**423. Analysis Procedure. (1-2). Credit 2. I, II**

Analysis made of occupations to obtain content for instructional information. Jobs and operations studied to determine order and content of operation, job description, job evaluation, and job safety.

**424. Organization of Instructional Material. (1-2). Credit 2. S**

Study will be made of published material available in student's occupational field. Those parts found suitable for industrial classes will be indexed and organized for class use. Types of instruction sheets found necessary for efficient teaching will be written.

**427. Driver Education. (1-6). Credit 3. II**

A study designed to teach content, methods and materials for instruction in both the classroom and practice phase of driver education. Critical analysis of motor vehicle accidents, driver attitudes, traffic laws and regulations. Experience in constructing and using teaching aids and in use of psychophysical testing devices.

**429. Foremanship and Supervision. (3-0). Credit 3. I**

Study of supervisory duties and responsibilities in industrial organization and procedures for meeting these responsibilities. Prerequisite: Senior classification.

**438. Industrial Safety. (2-3). Credit 3. II**

Continuation of I.Ed. 328. Includes analyses of accidents; organizations and programs of industrial safety departments; control of hazards, and application of safety engineering principles in design and specifications. Prerequisites: I.Ed. 328; I.En. 302; and either I.Ed. 429 or I.En. 401 or registration therein.

**442. Supervised Teaching in Industrial Arts. (2-12). Credit 6. I, II**

Observation of, and participation in, activities of typical industrial arts classroom. Student prepares lesson plans and presents demonstrations to pupils in industrial arts in public schools. Prerequisites: I.Ed. 204, 301; senior classification.

**444. Industrial Distribution. (3-0). Credit 3. I, II**

Seminar approach to study of problems of industrial distribution with assistance of representatives from industrial distributor organizations. Prerequisite: Junior classification.

**447. Electricity and Electronics. (2-3). Credit 3. I, II**

Continuation of I.Ed. 304. Laboratory experiences in construction and operation of electronic devices, including power supplies, receivers, amplifiers, and electronic controls. Prerequisite: I.Ed. 304.



**481. Seminar in Industrial Education. (1-0). Credit 1. I, II**

General discussion of laws, legislation, certification, professional ethics, and other current problems relating to industrial and teaching fields. Prerequisite: Senior classification.

**FOR GRADUATES****601. History of Industrial Education. (2-0). Credit 2. I, II, S**

Study of leaders, movements, and agencies with special emphasis on economic, social, and philosophical factors which have contributed to development of industrial education in the United States.

**602. Industrial Arts Administration and Supervision. (2-0). Credit 2. I, II, S**

Problems of local director or supervisor of industrial arts.

**603. Administration and Supervision of Vocational Industrial Education. (2-0). Credit 2. I, II, S**

Problems of local director or supervisor of vocational industrial education.

**604. Industrial Programs for Junior Colleges and Technical Schools. (2-0). Credit 2. I, II, S**

Study of kinds, purpose, size, accreditation, growth, and teaching problems in junior colleges, technical institutes, and adult schools, with particular emphasis on organization and presentation of industrial subject material in these schools.

**605. Problems in Industrial Safety. (2-0). Credit 2. I, II, S**

Basic reasons for accidents; prevention of industrial accidents; qualifications and duties of safety consultants; methods of making investigations; making investigations and how to prepare safety reports.

**606. Organization of Industrial Arts Department. (2-0). Credit 2. I, II, S**

Problems in determining type and size of industrial arts programs for various types and sizes of schools with plans for organization of each.

**609. Methods of Teaching High School Drawing. (2-3). Credit 3. I, II, S**

Survey of field drawing. Designing and organizing of problems and teaching devices.

**614. Guidance Seminar. (2-0). Credit 2. I, II, S**

Organization of occupational information; educational and vocational guidance; counseling case problems. Prerequisite: I.Ed. 406 or equivalent.

**616. Methods of Teaching Industrial Arts in Secondary Schools. (2-0). Credit 2. I, II, S**

Selecting and organizing instructional material for problems in a particular industrial activity.

**618. Tests and Measurements in Industrial Education. (2-0). Credit 2. I, II, S**

Study of testing and measuring devices and their application to industrial education subjects.

**619. Related Subjects in Part-Time Cooperative Programs. (2-0). Credit 2. I, II, S**

Organization and presentation of content material necessary in part-time cooperative programs, and direction of the study of students engaged in such programs.

**621. Philosophy of Vocational Education. (2-0). Credit 2. I, II, S**

Basic principles involved in development and operation of industrial education programs under State and Federal vocational laws.

**622. Philosophy of Industrial Arts Education. (2-0). Credit 2. I, II, S**

Principles involved in development and operation of industrial arts courses and their purpose and function in the field of general education.

**623. Vocational Guidance Procedures. (3-0). Credit 3. I, II, S**

Workshop approach to study of vocational guidance, programs, relationships, group techniques, and methodology of clinical approach.

**626. Classroom Management and Shop Organization. (2-0). Credit 2. I, II, S**

Organization of procedures to facilitate teaching; setting up roll-checking devices, issuing procedures for tools and materials, keeping material inventory, using assignment and progress charts, using student leadership in routine non-teaching class and laboratory routine, and keeping records.

**627. Teacher Training for Local Supervisors of Trade and Industrial Classes. (2-0). Credit 2. S**

Discussion of problems related to administration of industrial education programs, in-service training, and upgrading of programs on local level. Methods of organizing and conducting teacher improvement programs, including methods of conducting organized research.

**628. Organization of Vocational Industrial Schools and Classes. (2-0). Credit 2. S**

Methods of making surveys, determining needs for various industrial education programs, and organization of curriculum and classes according to State certification requirements.

**630. Auto Mechanics. (1-4). Credit 2. I, II, S**

Development and preparation of instructional materials and testing of laboratory problems pertaining to economic selection, operation, and maintenance of internal combustion engines, power transmission systems, and automated control systems.

**631. Electricity. (1-4). Credit 2. I, II, S**

Development and preparation of instructional materials for use by electricity and electronics teachers in industrial arts, vocational and technical education programs.

**632. Cabinet Making. (1-4). Credit 2. I, II, S**

Development and preparation of instructional materials and testing of laboratory problems pertaining to modern methods of kiln drying, veneer construction, upholstery, and fabrication within the furniture industry.

**633. Machine Shop. (1-4). Credit 2. I, II, S**

Development and preparation of instructional materials and testing of laboratory problems pertaining to modern practices and problems in teaching of advanced machine shop.

**634. Ornamental Metal Work. (1-4). Credit 2. I, II, S**

Development and preparation of instructional materials and testing of laboratory problems pertaining to various types of metal.

**635. Industrial Design and Development. (3-0). Credit 3. I, S**

Advanced procedure in preparing teachers for industrial design and development. Historical review of design, effect of aesthetic, social, and economic factors on a design concept and relationship between function and production processes. Prerequisite: I.Ed. 336 or equivalent.

**681. Seminar. (1-0). Credit 1. I, II, S**

General discussions of laws, legislation, certification, professional ethics, and other current problems relating to industrial education teaching profession.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Designed to enable Master's graduate majors to undertake and complete with credit limited investigations not within thesis research and not covered by any other course.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis or dissertation.

### **Department of Industrial Engineering**

Professors Burgess, CoVan, Wortham (Head); Associate Professor Smith; Assistant Professors Drew, Fox, Lamberson, Nash; Instructor Street

**201. Computer Programming for Engineers. (1-0). Credit 1. II**

Programming engineering calculations for solution by electronic computers using current algorithmic language. Prerequisite: Math. 308 or registration therein.

**302. Production Engineering. (1-2). Credit 2. I, II**

Coordinated study of manufacturing processes and equipment; operation sequence planning; economic aspects of equipment selection. Tooling and processing product from design to final assembly. Emphasis is on latest developments in manufacturing techniques. Prerequisite: M.E. 310.

**401. Survey of Industrial Engineering. (3-0). Credit 3. I, II, S**

Survey of industrial engineering field; administrative decisions, layout of equipment, materials handling, production control, quality control, motion and time study, cost determination, wage plans, job evaluations, operations research, use of computers by management. Prerequisite: Junior classification.

**403. Production Management. (3-0). Credit 3. II**

Survey course in principles of production for business administration majors. Prerequisite: Senior classification in business administration.

**404. Motion and Time Study. (2-3). Credit 3. I, II**

Standardization of job conditions; methods improvement and motion economy; flow process charts and diagrams, micromotion analysis, simo-charts, multiple-activity charts; allowances; rating methods; taking time studies; standard data and time formulas. Prerequisite: Junior classification.

**412. Labor and Industry. (3-0). Credit 3. I, II**

Brief review of history of organized labor; critical study of fundamental Federal and State laws governing labor-management relations; study of current interpretations of labor laws, controversial labor-management issues and their solutions. Prerequisite: Senior classification.

**414. Statistical Control of Quality. (2-3). Credit 3. I**

Engineering aspects of controlling quality through use of statistical methods. Frequency distributions, control charts for variables, control for fraction defective and defects per unit. Sampling inspection plans. Design of specifications. Prerequisite: Junior classification.

**415. Production Control. (1-3). Credit 2. I**

Planning and control of production; operation analysis; routing, scheduling; dispatching; production charts and boards; inventory control; accumulation of material requirements; forecasting; economic lot size. Critical path techniques. Prerequisites: I.En. 302, registration in 404.

**416. Factory Layout. (1-6). Credit 3. II**

Layout of complete factory for selected product. Use of machine templates and models; design of materials handling systems; auxiliary services; design of store-rooms; loading docks; machine selection; estimate of unit costs; estimate of capital requirements. Prerequisite: I.En. 415.

**420. Introduction to Operations Research. (3-0). Credit 3. II**

Study of modern techniques used by engineers for controlling manufacturing costs. Computing probable returns from investments. Use of break-even charts, profit graphs, machine replacement studies, comparison of alternative methods, standard costs. Introduction to operations research. Prerequisite: I.En. 414.

**453. Tool Engineering. (2-3). Credit 3. I**

Selection and design of tools, jigs, fixtures, and gages. Economics of choice of tooling. Dimensioning and tolerances. Methods of locating, clamping, and feeding. Principles of automation. Graphical solution of tool design problems. Numerical control of machine tools. Prerequisites: C.E. 305; I.En. 302; registration in M.E. 337.

**458. Programming of Digital Computers. (3-2). Credit 4. I, II, S**

Operation of digital computer; flow charts; sub-routines; library programs; floating point; multiple precision; error analysis; optimum coding; symbolic coding; interpretive coding; automatic coding; practical applications. Prerequisite: Junior classification.

**481. Seminar. (0-2). Credit 1. II**

Investigation and report by students of topics of current interest in industrial engineering. Experimental studies are made wherever feasible.



**485. Special Problems in Industrial Engineering. Credit 1 to 3. I, II, S**

Permits work on special project in industrial engineering. Project must be approved by Department Head. Prerequisite: Senior classification in industrial engineering.

**FOR GRADUATES****601. Industrial Surveys. (2-0). Credit 2. II**

Engineering problems related to industrial investigations, reports on organizations, personnel, capital equipment, financial policies, market, etc. Prerequisite: I.En. 416.

**603. Human Relations in Industry. (4-0). Credit 4. I**

Causes of misunderstandings between management and labor; conditions which influence attitudes and productivity of workers; principles of leadership. Direct worker incentive, seasonal bonuses, quality incentives, profit sharing plans. Prerequisites: I.En. 404, 412.

**604. Advanced Time and Motion Studies. (1-6). Credit 3. I**

Advanced methods in time and motion study; balancing operations, learning curves; work sampling; memomotion and chronocyclegraph studies; fatigue effects, determination and application of elemental time data; statistical methods in time study. Prerequisite: I.En. 404.

**608. Industrial Case Analysis. (3-0). Credit 3. II**

Practice in application of principles to solution of actual case problems involving broad management decisions. Special attention given to problems indigenous to Texas industry. Prerequisite: Graduate classification in industrial engineering or approval of Department Head.

**614. Advanced Quality Control. (3-3). Credit 4. I**

Advanced statistical methods applied to quality control problems; significance tests; correlation analysis; sequential sampling; analysis of variance; design of engineering experiments; principles of reliability. Prerequisite: I.En. 414.

**615. Production and Inventory Control. (3-3). Credit 4. II**

Recent developments in techniques used to control inventories and production by means of statistical analysis of problems, simulation techniques, and mechanized execution of inventory and production control functions. Prerequisite: I.En. 415.

**620. Principles of Operation Analysis. (4-0). Credit 4. II**

Use of mathematical models in making decisions; optimizing over-all policies; probability methods, linear programming; transportation models; queuing theory; learning curves; information theory; Monte Carlo methods. Prerequisites: I.En. 420, 614.

**621. Computer Methods in Industrial Engineering. (2-3). Credit 3. I, S**

Principles and applications of computers to solution of various industrial engineering problems. May not be taken for credit with I.En. 615 and 620. Prerequisites: I.En. 458; graduate classification in engineering or computer science.

**641. Computer Languages. (2-6). Credit 4. I, S**

Study of design and use of computer oriented and problem oriented languages for digital computers. Prerequisites: I.En. 458; Math. 417.

**642. Computer Methods in Applied Sciences. (2-6). Credit 4. II**

Techniques of analysis and programming required to utilize stored program digital computer for solution of some typical physical systems. Prerequisites: I.En. 458; Math. 609.

**643. Logic of Information Processing. (2-6). Credit 4. II**

Principles and application of digital computers to problems of data reduction, information retrieval, and large scale commercial data processing problems. Prerequisite: I.En. 641.

**645. Data Processing Management. (3-0). Credit 3. S**

Presents comprehensive study of problems associated with management of data processing facility. Particular emphasis placed on problems of machine configuration, personnel, systems planning, and personnel training requirements. Prerequisite: I.En. 641.

**651. Tool Design. (3-3). Credit 4. II**

Design of automatic machine tools; tracer and director control of tool paths; automatic feeding, holding, indexing and ejection of work pieces; tool replacement analysis. Automatic inspection and sorting, assembly, and packaging. Prerequisite: I.En. 453.

**681. Seminar. (2-0). Credit 2. II**

Group study and discussion of current developments in industrial engineering practices as reported in literature and as presented by representatives from industry. Prerequisite: Graduate classification in industrial engineering.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Investigation of special topics not within scope of thesis research and not covered by other formal courses. Prerequisite: Graduate classification in industrial engineering.

**691. Research. Credit 1 or more each semester. I, II, S**

Research in industrial engineering field; subject to meet needs of individual student.

## **Department of Journalism**

Professor McGuire (Head); Associate Professor Bowers; Assistant Professor Knight; Instructors Boggan, Chastain, Gougler

**102. Communications Media and Principles. (2-0). Credit 2. I, II**

Introductory survey of mass communications media, their purpose and methods of operation to give the journalism major a panoramic view and the non-major an understanding of importance of communications media in modern society.

**201. News Writing. (2-3). Credit 3. I**

Beginning reporting; study of types of news; leads; body treatment of story; feature in lead; facts; background and practice in writing straight news story. Prerequisite: Knowledge of typing.

**202. Beginning News Reporting. (2-3). Credit 3. II**

Study of news sources; style; interviewing; news analysis and discussion; handling of various types of news, emphasis on clear writing; practical reporting experience. Prerequisite: Jour. 201.

**300. Summer Practice. Ten weeks; required; no credit. S**

Summer practice in newspaper, magazine, or other communications office, as approved by Department Head. Required previous to registration for fourth year. Prerequisite: Junior classification.

**304. Feature Story Writing. (2-2). Credit 3. I**

Writing of magazine and feature stories; types of feature articles; sources; titles; markets; slanting articles for particular markets; style, word usage; beginnings, illustrations.

**306. Newspaper Production and Management. (3-0). Credit 3. II**

Business of managing newspaper; community newspaper; study of newspaper as service organization; social responsibilities; influence of community; mechanics of printing; managership; business side of conducting paper. Prerequisite: Jour. 202.

**307. News Editing. (2-3). Credit 3. I**

Editing of news; intensive training in publication style, news evaluation, copy reading mechanics and techniques, headline writing and proof-reading; understanding of journalistic responsibilities. Prerequisite: Jour. 202.

**308. Newspaper Advertising. (2-3). Credit 3. I**

Advertising layout and copy for newspapers and other publications; intensive practice in newspaper layouts; writing of retail copy; servicing of newspaper accounts. Prerequisite: Approval of instructor.

**309. Advertising Copy, Layout and Production. (2-3). Credit 3. II**

Application of tested advertising methods to preparation of merchandising copy; layout design; and production of publication advertising. Sales appeals; attention

factors, layout planning, illustrations, copy writing, production methods and problems. Prerequisite: Jour. 308.

**311. Radio and Television News Writing. (2-2). Credit 3. II, S**

Study and analysis of basic methods of writing for radio and television; special emphasis on techniques required in processing news copy; pictures and film. Guidance in newsroom operation, getting story, filming news; scripting and editing, and handling equipment.

**315. Photography. (1-3). Credit 2. I, II, S**

Fundamentals of photographic theory and practice; cameras, lenses and shutters; exposure and development of negative; black and white printing processes; lighting (natural, flash, and flood). Emphasis on photography as medium of communication.

**321. Industrial Journalism. (2-2). Credit 3. I, II, S**

Study of technique of writing technical articles and reporting news related to engineering, industry, science, and other specialized interests; preparation of fact articles for technical and trade journals.

**406. Publicity and Public Relations. (3-0). Credit 3. II**

Practical analysis of various fields of publicity and public relations. Theory and practice in various aspects of functioning publicity, including news writing, advertising, and radio.

**409. History and Principles of Journalism. (3-0). Credit 3. I**

Development of American journalism from colonial times to present, projecting the press as institution against background of economic, social, and political history of the nation. Includes ethics of profession.

**410. Publications Production and Graphic Arts. (2-3). Credit 3. II**

Brief history of printing; practical design, layout, and editing of publications with laboratory practice in copy and picture selection and editorial supervision. Prerequisite: Jour. 307.

**412. Editorial Writing. (3-0). Credit 3. II**

Writing of editorials; editorial page; editorial campaigns; what constitutes editorial policy; ethics in editorial writing. Prerequisite: Jour. 304.

**415. Agricultural Journalism. (2-2). Credit 3. I, II, S**

Basic news writing; emphasis on preparation of articles for actual publication in newspapers and agricultural journals. Research and other campus activities serve as source material for writing articles in laboratory.

**418. Reporting of Public Affairs. (2-3). Credit 3. I**

Study and practice in reporting crime, the courts, and governmental activities with emphasis on interpretation of these news areas. Prerequisite: Jour. 202.

**420. Law of the Press. (3-0). Credit 3. II**

A detailed study of laws of publication and consideration of defamation, sedition, privilege, and ethics. General laws, relating to the press of the United States and of the states with emphasis on Texas. Prerequisite: Jour. 307 or approval of Department Head.

**462. High School Journalism and Publications. (3-0). Credit 3. S**

Problems of advising school newspapers and yearbooks; school publication as public relations tool; selecting and training staff; financing; planning content of high school journalism course. Prerequisites: Twelve semester hours of English; approval of Department Head.

**465. International Communications and Propaganda. (3-0). Credit 3. I**

Communication problems and practices of major nations. Theory and functioning of the press under fascism, communism and democracy; international news distortion and propaganda; place of mass media in international relations. Prerequisites: Senior classification; approval of Department Head.

**466. Techniques of Mass Communications. (3-0). Credit 3. II, S**

Survey of methods of research in mass communications. Directed reading and discussion of outstanding professional literature in field of journalism, and analysis of major issues in contemporary journalism. Prerequisites: Senior classification; approval of Department Head.



**485. Problems. Credit 1 to 4 each semester. I, II, S**

Research problems related to communications field. Individual work, fitted to special needs of specific student as determined by his interests and aptitude.

**Department of Management**

Professors Goode, Hoyle; Associate Professors Elkins, Rice (Head), Stewart;  
Assistant Professors Dozier, Eckles, House, Sandstedt, Simons

**105. Introduction to Business. (3-0). Credit 3. I, II, S**

Provides over-all picture of business operation; includes analysis of specialized fields within business organization; identifies role of business in modern society.

**106. Business Organization. (3-0). Credit 3. I, II, S**

Authority, delegation, responsibility; functional analysis of organization and management; organization for production, distribution, and finance. Prerequisite: Mgmt. 105 or approval of instructor.

**211. Business Law. (3-0). Credit 3. I, II, S**

Nature and scope of law; court system; law of contracts; principal and agent; business organizations, including partnerships and corporations; Texas community property laws. Prerequisite: Sophomore classification.

**212. Business Law. (3-0). Credit 3. I, II, S**

Additional studies in law of business, dealing with bailments, carriers, mortgages, suretyships, negotiable instruments, banks and banking, wills and estates, sales, bankruptcy. Prerequisite: Mgmt. 211.

**340. Purchasing. (3-0). Credit 3. II**

Fundamental objectives of purchasing and modern procurement principles and practices. Organization of the purchasing function, purchasing research, price negotiation, inventory management, and value analysis. Prerequisite: Approval of instructor.

**363. Principles of Management. (3-0). Credit 3. I, S**

Planning, organizing, motivating, and controlling functions of business; coordinated managerial philosophy in production, finance, and distribution; analytical approach to business problems. Prerequisite: Junior classification or approval of instructor.

**422. Personnel Problems of Industry. (3-0). Credit 3. I, II, S**

Relation of worker to his employer; job finding and interviewing; occupational trends; functions and structure of personnel departments; problems of contemporary industrial development. Prerequisite: Junior classification.

**423. Human Relations in Business. (3-0). Credit 3. I, II, S**

Study of problems arising from association of people in work environments. Prerequisites: Mgmt. 422; Psy. 303; or approval of instructor.

**424. Organization Theory. (3-0). Credit 3. II**

Study of organization theory as applied to business. Prerequisite: Mgmt. 423 or approval of instructor.

**452. Veterinary Jurisprudence. (3-0). Credit 3. I, II**

Statutes and court decisions pertaining to veterinary medicine. Prepares student for State Board Examination in veterinary law. Prerequisite: Senior classification in College of Veterinary Medicine.

**459. Management Problems. (3-0). Credit 3. I, S**

Case study approach to management problems with emphasis on quantitative analysis and decision making. Prerequisite: Mgmt. 363 or approval of instructor.

**460. Management Systems and Control. (3-0). Credit 3. II**

A study of man-machine systems, with emphasis on the development and use of computer simulation models to provide planning and control information to management. Prerequisite: B.Ana. 337 or approval of instructor.

**466. Management Policy. (3-0). Credit 3. II, S**

Policy problems of business organization. Integrates fields of marketing, finance, accounting, economics, law, and insurance into decision making. Prerequisite: Senior classification in business administration.

**485. Problems. Credit 1 to 3 each semester. I, II, S**

Directed study on selected problems in the area of management not covered in other courses. Prerequisites: Senior classification; approval of Department Head.

**FOR GRADUATES****609. Management Seminar. (3-0). Credit 3. I, S**

Study of organization theory and its application to business systems. Prerequisites: Graduate classification; approval of instructor.

**643. Legal Relationships. (3-0). Credit 3. II, S**

Various relationships based on law encountered by business executive; agreements; circumstantial relationships; and governmental responsibilities. Prerequisites: Graduate classification; approval of graduate advisor.

**655. Survey of Management. (3-0). Credit 3. I, II, S**

Personnel and production management practices and theories; organization, plant layout, efficiency studies, control administration, personnel methods and techniques, and human relations. Prerequisites: Graduate classification; approval of graduate advisor.

**663. Legal Environment of Business. (3-0). Credit 3. I, S**

Constitutional and legislative enactments; stare decisis and judicial process; regulation of commerce; taxation and regulations of competition, business and labor. Prerequisites: Graduate classification in business administration; approval of graduate advisor.

**672. Management Information Systems. (3-0). Credit 3. I, S**

Integrative approach to data processing and management information systems with emphasis on data flow, systems analysis and design, and information economics. Prerequisites: Graduate classification; approval of graduate advisor.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Critical examination of subject matter presented in current periodicals, recent monographs and bulletins in field of management.

**685. Problems. Credit 1 to 3 each semester. I, II, S**

Directed study on selected problems using recent developments in business research methods. Prerequisites: Graduate classification; approval of instructor.

**691. Research. Credit 1 or more each semester. I, II, S**

Research on thesis.

**Department of Marine Engineering**

Associate Professors Dahm, Tormollan (Acting Head); Assistant Professors Fairbanks, French, Mercer; Instructor Luehning; Lecturer Moore

**102. Orientation. (0-2). Credit 1. I**

Introduction to basic marine engineering systems. General description of ship-building industry related to steamship industry. Career of engineer officer surveyed.

**200. Basic Operations. Credit 4. S**

Represents practical application of student's classroom studies while at sea in training ship during sea training period. Student required to complete several projects relating to engineering plant of ship.

**201. Marine Engineering Mechanics. (3-0). Credit 3. I**

Application of principles of mechanics to elementary problems of marine engineering design. Topics include: forces and couples, analysis of structures and friction; principles of kinetics and kinematics.

**203. Engineering Laboratory. (1-3). Credit 2. I**

Study of pipe and valve standards; packing and gasket material; gearing and bearings; use of brass and copper service tubing; silver brazing techniques; corrosion controls in heat exchangers.

**204. Engineering Laboratory. (1-3). Credit 2. II**

Academic and practical study of various marine power systems in use today and some future developments. Visits to various ships in Galveston harbor and to local shipyard will be scheduled.

**300. Intermediate Operations. Credit 4. S**

Training program for second sea training period. Sea projects required of each student under supervision of officer-instructors. Lifeboat and safety training included.

**301. Fluid Mechanics and Heat Transfer. (3-0). Credit 3. I**

Application of principles of fluid statics and dynamics to marine engineering problems. Study of fundamental laws relating to heat flow; characteristics of pumps; topics in compressible flow.

**302. Engineering Laboratory. (0-3). Credit 1. II**

Demonstration of basic concepts of fluid mechanics; calibration of flow meters, centrifugal pumps, orifice and weir flow. Additional practice given in principles and operations of power machinery.

**303. Marine Thermodynamics. (3-0). Credit 3. I**

Energy concepts. First and second law of thermodynamics. Carnot and Rankine principles and reversible heat cycles. Properties and processes of vapors; vapor power cycles and vapor refrigeration cycles.

**304. Marine Thermodynamics. (3-0). Credit 3. II**

Properties and processes of perfect gases, gas compression cycles, gas power cycles, air refrigeration cycle, and processes involving mixture of gases and vapors.

**305. Strength of Materials. (3-0). Credit 3. II**

Fundamental principles underlying analysis and design of machine members subjected to various combinations of loading. Emphasis given to theoretical and empirical basis for material specification formulas as found in United States Coast Guard Marine Engineering Regulations.

**306. Marine Refrigeration and Air Conditioning. (2-2). Credit 3. II**

Theory and practice of mechanical refrigeration. Specific topics include: thermodynamics of Reverse Carnot cycle, vapor compression cycles; thermal, physical, and chemical properties of refrigerants. Descriptions of shipboard ventilation and air conditioning.

**307. Electrical Circuits. (3-2). Credit 4. I**

Study in fundamental electrical theory as it applies to understanding of behavior, mode of operation, applications, and maintenance of electrical equipment as used aboard ship. Measurements of circuit phenomena, including fundamental amplifiers and rectifiers. Prerequisites: Math. 122; Phys. 202.

**308. Electrical Machinery. (3-2). Credit 4. II**

Study of principal types of electrical machines aboard ship, including their characteristics, applications, and control devices. Laboratory work includes actual operation and testing of electrical machinery and equipment of type installed aboard ships.

**400. Advanced Operations. Credit 4. S**

Training program for third sea training period. At end of this period each student will have achieved knowledge and will have demonstrated his ability to take complete charge of modern marine power plant while underway at sea.

**401. Nuclear Propulsion I. (3-0). Credit 3. I**

Study of reactor mechanics with emphasis placed on fluid hydraulics, reactor core design, reactor fuels and their properties, shielding, construction and operation of related auxiliary machinery.



**402. Diesel Engineering. (2-2). Credit 3. II**

Basic principles of two and four stroke cycle diesel engines; intake, scavenging and exhaust systems; injection systems, starting and reversing methods; cooling and lubricating systems; and engine room layout in modern motor vessels.

**403. Marine Steam and Gas Turbines. (2-2). Credit 3. I**

Analysis of gas turbine cycles, high speed gas flow, turbine and compressor kinematics and thermodynamics; construction of marine steam turbines and their operating principles as applied to main propulsion and auxiliary use aboard ship; reciprocating engines.

**405. Steam Generators. (2-2). Credit 3. I**

Characteristics, historical development, and classification of marine boilers. Construction specifications of U. S. Coast Guard Marine Engineering Regulations. Principles of combustion and boiler heat balance when using fuel oil. Water conditioning and procedures in operation and maintenance.

**406. Engineering Repairs. (1-3). Credit 2. II**

Basic foundations in theory and practical applications of machinery repair equipment commonly found aboard ship. Practice in oxy-acetylene welding, brazing, cutting and electric arc welding; pipe welding, tube sweating; valve and pump maintenance; emergency repairs.

**408. Nuclear Propulsion II. (2-2). Credit 3. II**

Study of reactor controls and instrumentation including basic electronics, design, installation, and maintenance of various types of control systems. Survey of nuclear propulsion and marine industry. Advantage taken of shipyard nuclear facilities in Galveston area for practical field trips.

**414. Ship Automation. (4-0). Credit 4. II**

Study of closed loop devices including electrical, hydraulic, and mechanical systems. Ship application of automation, both current and future; survey of electron devices, instrumentation, and control. Prerequisites: Mar.E. 308; Math. 308.

**415. Nuclear Propulsion III. (3-0). Credit 3. II**

Continuation of Mar.E. 408. Prerequisite: Mar.E. 408.

## Department of Marine Transportation and Nautical Science

Associate Professor Smith (Head); Assistant Professor Hopkins; Instructor Cannon;  
Lecturer Devoy

### MARINE TRANSPORTATION

**101. Maritime Orientation. (0-2). Credit 1. I**

Survey of maritime industry, ocean transportation, trade routes, and role played by U. S. Merchant Marine in world trade and national defense. Ship organization and general operating methods are discussed. Emphasis placed on career patterns.

**301. Ocean Transportation I. (4-0). Credit 4. I**

Concerned with shipping in world economy; production of service, including shipping process, equipment, labor, conferences, rate-making, role of government; buying of service by shipper; finance of shipping; and international conventions and treaties.

**302. Marine Cargo Operations I. (2-2). Credit 3. I**

Essential requirements and problems in stowage and carriage of general and bulk (dry and liquid), refrigerated, and special cargos. Theoretical and practical problems in receiving, stowing, securing, transporting, and discharging all types of cargo.

**304. Ocean Transportation II. (3-0). Credit 3. II**

Concerned with carriage of goods under bills of lading and charter parties; terminal management and operation and types of carriers. Pertinent sections of American and British Shipping Laws are thoroughly studied. Prerequisites: Mar.T. 301.

**402. Ocean Transportation III. (4-0). Credit 4. III**

Covers essential principles of Admiralty and Maritime Law; advanced principles of marine insurance. Takes up in detail standard forms of Institute Clauses. Attention paid to nuclear maritime insurance activities. Principles of International Law are discussed. Prerequisite: Mar.T. 304.

**406. Marine Cargo Operations II. (2-2). Credit 3. II**

Stowage of special cargoes; ship's papers; entry and clearance procedures are covered. Laboratory work consists of problems involving research and planning. Each student will complete project related to shipping process.

**NAUTICAL SCIENCE****200. Basic Communications, Navigation, and Seamanship. Credit 4. S**

Practical application of student's classroom studies aboard training ship during first training cruise. Student completes basic projects in communications, navigation, and seamanship.

**201. Naval Architecture I. (3-0). Credit 3. I**

Description of ship as self-sustaining unit; shipbuilding nomenclature and dimensions, types of construction and classification of merchant ships; classification societies; shipbuilding materials and methods, and structural components of ship.

**202. Naval Architecture II. (2-0). Credit 2. II**

Ship's lines drawing and form calculations; principles of flotation and buoyancy; inclining experiments, free liquids, transverse stability; motion of ships in waves, seaway and dynamic loads; ship structure tests.

**203. Seamanship I. (2-3). Credit 3. I**

Art of handling small boats under oars, sail, and power. Lifeboat launching and equipment; construction and types of boats. Application of ground tackle, knotting and splicing, blocks and tackle. Communications practice; Rules of Nautical Road.

**204. Terrestrial Navigation. (2-2). Credit 3. I**

Fundamentals of basic navigation with definitions; plane sailing, middle latitude sailing, and mercator sailing; piloting, charting projections, chart navigation.

**300. Intermediate Communications, Navigation, and Seamanship. Credit 4. S**

Practical application of student's classroom studies aboard training ship during second training cruise. Student completes intermediate projects in communications, navigation, and seamanship.

**301. Seamanship II. (2-3). Credit 3. I**

Mechanical appliances on shipboard; heavy lifts; accident prevention. Marine inspection laws and communications.

**302. Seamanship III. (1-3). Credit 2. II**

Qualifying tests in communications. Thorough study made of U. S. Public Health requirements in first aid and ship sanitation. Marine inspection rules for safety at sea are stressed.

**303. Celestial Navigation. (2-3). Credit 3. I**

Survey of nautical astronomy, use of nautical almanac, sextant, compass error, and several short tabulated methods of solving the astronomical triangle are covered. Study of navigator's work at sea.

**304. Electronic Navigation. (2-2). Credit 3. II**

Study of theory, methods, and application of determining position by means of electronic aids including radar, direction finder, and Loran. Student examined by U. S. Coast Guard for certification as Radar Observer.

**400. Advanced Communications, Navigation and Seamanship. Credit 4. S**

Represents practical application of student's classroom studies aboard training ship during third training cruise. Student completes advanced projects in communications, navigation, and seamanship.

**401. Seamanship IV. (2-3). Credit 3. II**

Principles and methods of propulsion and steering of ships. Ship handling in heavy seas, docking, undocking, anchoring, mooring, towing, salvage, and ice seamanship.

ship. Damage control stressed. Qualification examinations are held in seamanship and communications.

**404. The Navigator. (2-3). Credit 3. II**

Exercises in day's work of navigator at sea. Planning routes of voyages. Study made of buoyage systems used throughout world and survey made of various sailing guides and port directories. Gyroscope compass fundamentals and magnetic compass compensation.

### Department of Marketing

Associate Professor Thompson (Head): Assistant Professor Tadlock; Instructors Disinger, Wynn

**314. Advertising. (3-0). Credit 3. I, II, S**

Place of advertising in business; advertising media; methods of advertising; consumer habits and psychology; advertising campaigns; cost analysis; legal and ethical problems in advertising. Prerequisite: Mktg. 321.

**321. Marketing. (3-0). Credit 3. I, II, S**

Study of institutions, processes, and problems involved in transferring goods from producers to consumers, with emphasis on economic and social aspects. Prerequisite: Econ. 204.

**325. Retailing. (3-0). Credit 3. I, II, S**

Fundamental operations of retailing concerns and need for effective coordination of retailing activities. Prerequisite: Mktg. 321.

**435. Salesmanship. (3-0). Credit 3. I, II, S**

General principles of personal selling with emphasis given to industrial, wholesale, specialty selling and sales engineering. Prerequisite: Mktg. 321.

**436. Sales Management. (3-0). Credit 3. I, II, S**

Problems confronting sales executives; organization of sales departments, product research, selection and recruiting; compensation plans, routing, supervision, and cost analysis. Prerequisite: Mktg. 435 or 448.

**445. Marketing Research. (3-0). Credit 3. I, II, S**

Nature and uses of marketing research in business. Methods of collecting and interpreting marketing information and specific application to problems in marketing. Prerequisites: B.Ana. 303; Mktg. 321.

**446. Marketing Industrial Products. (2-0). Credit 2. I, II**

Marketing research, marketing policies, channels of distribution, brand policy, pricing, and control of marketing operations as they affect industrial products. Prerequisites: B.Ana. 303; Mktg. 321.

**447. Advertising Procedures. (3-0). Credit 3. I**

Advertising procedures for newspapers, magazine, radio, and television; retail, mail order, national, and industrial advertising; advertising agencies; advertising research. Prerequisite: Mktg. 314.

**448. Marketing Problems. (3-0). Credit 3. II**

Problems in marketing of industrial and consumer goods; customer relations, channels of distribution, brands, sales promotion, pricing, and legislation. Prerequisite: Mktg. 321.

**485. Problems. Credit 1 to 3 each semester. I, II, S**

Directed study on selected problems in the area of marketing not covered in other courses. Prerequisites: Senior classification; approval of Department Head.

### FOR GRADUATES

**622. Trade Regulations. (3-0). Credit 3. II, S**

Governmental control including Federal anti-trust acts; Federal Trade Commission and unauthorized business practices; price discrimination and retail price maintenance. Prerequisite: Mgmt. 211.



**649. Survey of Marketing. (3-0). Credit 3. I, II, S**

Analysis of marketing functions and institutions; marketing mix related to consumers, trade, and industrial products. Emphasis on terminology and essential concepts. Prerequisites: Graduate classification; approval of graduate advisor.

**675. Marketing Management. (3-0). Credit 3. II, S**

Analysis of marketing as it relates to over-all business objectives; marketing activities integrated with other business functions, analysis, strategy, and tactics. Prerequisites: Graduate classification in business administration; approval of graduate advisor.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Critical examination of subject matter presented in current periodicals, recent monographs and bulletins in field of marketing.

**685. Problems. Credit 1 to 3 each semester. I, II, S**

Directed study on selected problems using recent developments in business research methods. Prerequisites: Graduate classification; approval of instructor.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis.

## Department of Mathematics

Professors Basye, Brewer, Hurt, Keown, Klipple (Head), Kreyszig, Luther; Associate Professors Hall, Kent, McCulley, McGee, Moore, Sims, Tittle; Assistant Professors Bailey, Bryant, Huggins, Lyle, Perry, Sampson, Spencer; Instructors Abdo, Gonzalez, Heatherly, Hovorak, Koehl, Moehlman, Porter, Todd, Williams; Lecturer Chisholm

**101. Algebra. (3-0). Credit 3. I, II, S**

Review of fundamentals of mathematics, graphs, systems of linear equations, exponents and radicals, quadratic equations, binomial theorem.

**102. Algebra. (3-0). Credit 3. I, II, S**

Sets, structure of number system; absolute values, solution sets of equations of second and higher degree, of systems of equations, and of inequalities; relations and functions, graphical representations, variation; progressions; mathematical induction; determinants; partial fractions.

**103. Plane Trigonometry. (3-0). Credit 3. I, II, S**

Definitions of trigonometric functions, evaluation of functions of special angles, fundamental relations, solution of triangles, trigonometric reductions, angular measure, functions of composite angle, logarithms, inverse trigonometric functions, trigonometric equations.

**104. Analytic Geometry. (3-0). Credit 3. I, II, S**

Rectangular coordinates; equations and sets of points; lines, circles, and other conic sections; transformations, parametric equations; graphs of transcendental functions; polar coordinates; equations of surfaces.

**106. Spherical Trigonometry. (3-0). Credit 3. II**

Geometry of sphere; solution of spherical triangles; application of spherical trigonometry to terrestrial and celestial spheres. Brief survey of celestial system included. Prerequisite: Math. 103.

**110. Survey Course in Mathematics. (3-0). Credit 3. I, II, S**

Function and graphs, derivatives of polynomials, integrals of polynomials, systems of equations, logarithms, progressions, binomial theorem, compound interest and annuities, permutations and combinations, probability. Prerequisite: Math. 102.

**116. Plane Trigonometry and Analytic Geometry. (4-0). Credit 4. I, II**

Trigonometric functions, fundamental relations, solutions of triangles, angular measure, logarithms, graphs; the straight line, circle, parabola, ellipse, hyperbola, polar coordinates, sketching of surfaces. Prerequisite: Math. 102. (For students registered in architecture.)

**121. Analytic Geometry and Calculus. (4-0). Credit 4. I, II, S**

Rectangular coordinates; equations and sets of points; lines, conic sections; functions, limits, derivatives of algebraic functions, applications, integration of polynomials, areas and volumes by integration. Prerequisites: Math. 102 and 103, or satisfactory performance on a qualifying examination.

**122. Calculus. (4-0). Credit 4. I, II, S**

Derivatives of transcendental functions; comprehensive study of integration; application of integration to moments, arc lengths, areas of surfaces of revolution, liquid pressure, and work; improper integrals; indeterminate forms. Prerequisite: Math. 121 or 209.

**209. Calculus. (3-0). Credit 3. I, II, S**

Variables, functions, and limits. Derivatives and differentials for polynomials and applications. Integration of polynomials and applications. Differentiation of algebraic functions. Prerequisite: Math. 104.

**210. Calculus. (3-0). Credit 3. I, II, S**

Differentiation and integration involving transcendental functions together with applications. Improper integrals, approximate integration, indeterminate forms, mean value theorems. Prerequisite: Math. 209.

**215. Finite Mathematics. (3-0). Credit 3. I, II**

Logic, theory of sets, Venn diagrams, partitions and counting, vectors and matrices, linear programming, theory of games, applications to business problems. Prerequisite: Math. 110.

**223. Differential and Integral Calculus. (4-0). Credit 4. I, II**

Limits, the derivative, maxima and minima, differentiation of polynomials; the definite integral; volume, differentiation of implicit functions, special devices for integration, center of gravity, moment of inertia, double integrals. Prerequisite: Math. 116. (For students registered in architecture.)

**303. Theory of Equations. (3-0). Credit 3. I, II**

Sets, relations, functions, binary operations, axiomatic study of number systems; vector spaces, linear transformations; permutations, groups. Prerequisite: Math. 122 or 210.

**307. Calculus. (3-0). Credit 3. I, II, S**

Introduction to series. Taylor's series, partial differentiation, multiple integrals, applications. Prerequisite: Math. 122 or 210.

**308. Differential Equations. (3-0). Credit 3. I, II, S**

Elementary and linear equations with applications, solution by Laplace transforms and by series, Fourier series, applications. Prerequisite: Math. 307.

**315. Introduction to Modern Algebra. (3-0). Credit 3. I, II, S**

Sets and mappings, groups, rings, integral domains, number theory, isomorphism, fields, vector spaces, matrices. Prerequisite: Math. 122 or 210 or 215.

**405. Vector Analysis. (3-0). Credit 3. I, II, S**

Elementary operations, vector and scalar products of two vectors, vector and scalar products of three vectors, differentiation of vectors, differential operators, applications to electrical theory, dynamics, mechanics, and hydrodynamics. Prerequisite: Math. 307.

**407. Complex Variables. (3-0). Credit 3. I, II, S**

Fundamental theory of analytic functions, including residues and their applications. Prerequisite: Math. 308.

**409. Advanced Calculus. (3-0). Credit 3. I, II, S**

Concept of function, limit of sequence, continuity, theorems on continuous functions, definite integral, derivative, mean value theorems, hyperbolic functions, improper integrals. Prerequisite: Math. 307.

**410. Advanced Calculus. (3-0). Credit 3. II, S**

Theory of plane curves, mechanics of a particle, Taylor's theorem and applications, numerical integration, convergence and divergence of series, power series, periodic functions, Fourier series. Prerequisite: Math. 409.

**411. Mathematical Probability. (3-0). Credit 3. I, II**

Event sets; probability concepts; functions based on discrete and continuous event sets; binomial, hypergeometric, gamma, beta and normal functions; moments and moment generators; determination of probability functions by inverse processes. Prerequisite: Math. 307.

**414. Mathematical Statistics. (3-0). Credit 3. I, II, S**

History and terminology of statistics, probability theory, discrete and continuous distributions, expected values, moments, sampling, confidence intervals, tests of hypotheses. Prerequisite: Math. 307.

**415. Modern Algebra. (3-0). Credit 3. I, S**

Integers, rational numbers, real numbers, complex numbers. Groups, rings, integral domains, fields. Polynomials over a field. Prerequisite: Math. 307.

**416. Modern Algebra. (3-0). Credit 3. II**

Fundamental concepts of group theory. Introduction to representation theory of finite groups. Prerequisite: Math. 415.

**417. Numerical Analysis. (3-3). Credit 4. I, II, S**

Numerical methods, error and convergence analysis, orthogonal polynomials, elementary matrix theory, computer programming of appropriate problems. Prerequisite: Math. 308 or registration therein.

**485. Problems. Credit 1 to 4. I, II, S**

Special problems in mathematics not covered by any other course in the curriculum. Work may be in either theory or laboratory. Prerequisite: Approval of Department Head.

**FOR GRADUATES****600. Fundamental Mathematics in Secondary Schools. (3-0). Credit 3. S**

Basic concepts of arithmetic, algebra, geometry, and trigonometry as viewed from standpoint of higher analysis; famous problems; construction of tables and slide rules; other topics designed to help vitalize teaching of high school mathematics. Prerequisite: Math. 122 or 210.

**601. Higher Mathematics for Engineers and Physicists. (4-0). Credit 4. I, II, S**

Surface integrals, line integrals, vector analysis, partial differential equations, elementary complex variables, applications. Prerequisite: Math. 308.

**602. Higher Mathematics for Engineers and Physicists. (4-0). Credit 4. I, II, S**

Fourier integrals, Bessel and Legendre functions, Laplace's equation, diffusion equation, wave equation, Green's functions. Prerequisite: Math. 601.

**606. Theory of Probability. (4-0). Credit 4. II**

Markov processes, matrix theory applications, special limit theorems, transforms. Prerequisite: Math. 411.

**607. Real Variables. (4-0). Credit 4. I**

Fundamental theory of number sets and point sets, elementary applications to real functions, theory of linear measure. Prerequisite: Math. 409.

**608. Real Variables. (4-0). Credit 4. II**

Measurable functions, the Riemann integral, the Lebesgue integral, applications to real functions and series. Prerequisite: Math. 607.

**609. Numerical Analysis. (3-3). Credit 4. I, II**

Linear and non-linear programming; simulation, Monte Carlo techniques, game theory. Laboratory will consist of programming appropriate problems. Prerequisite: Math. 417.

**610. Numerical Methods in Differential Equations. (3-3). Credit 4. II, S**

Elementary numerical solutions, analytical foundations, systems of equations, higher order equations, two-point boundary problems, numerical methods for partial differential equations. Laboratory will consist of programming a high speed digital computer. Prerequisite: Math. 417.



**611. Ordinary Differential Equations. (4-0). Credit 4. I**

General methods for first order equations, singular solutions, applications, special methods, linear equations of second order, method of successive approximations, systems of ordinary equations. Prerequisite: Math. 601.

**612. Partial Differential Equations. (4-0). Credit 4. II**

General solution of first order equations, second order equations from physics and mechanics. Prerequisite: Math. 611 or equivalent.

**615. Vector Spaces and Matrices. (4-0). Credit 4. I**

Development of fundamental properties of matrices by use of vector spaces and linear transformations. Prerequisite: Math. 409 or 415.

**616. Linear Transformations and Matrices. (4-0). Credit 4. II**

Development of canonical forms for matrices by use of transformations. Prerequisite: Math. 615.

**617. Complex Variables. (3-0). Credit 3. I, S**

Conformal mapping, the Schwartz-Christoffel theorem, infinite products, entire functions, meromorphic functions, the gamma function. Prerequisite: Math. 407.

**618. Complex Variables. (3-0). Credit 3. II**

Hypergeometric functions, elliptic functions, Riemann surfaces. Prerequisite: Math. 617.

**620. Fourier Series and Allied Topics. (4-0). Credit 4. II**

First four chapters of Zygmund plus recent developments in almost everywhere convergence of Fourier series. Prerequisite: Math. 608 or registration therein.

**622. Laplace Transforms. (4-0). Credit 4. II, S**

Fundamental theorems concerning Laplace transforms. Applications to ordinary and partial differential equations, difference equations, and integral equations. Prerequisite: Math. 601.

**625. Matrix Algebra and Tensor Calculus. (4-0). Credit 4. I, II**

Elementary matrix operations; canonical forms; special matrices; characteristic roots; tensor concept; covariance and contravariance; metric tensors; Christoffel's symbols; covariant differentiation. Prerequisite: Math. 405 or 601.

**627. Theory of Numbers. (3-0). Credit 3. I**

Ordered rings, the ring of integers, Euclidean rings, congruences, the Fermat-Euler theorem, residues of powers, quadratic residues, the Legendre and Jacobi symbols, quadratic reciprocity, character sums, diophantine equations, tests for primality. Prerequisite: Math. 409 or 415.

**628. Theory of Numbers. (3-0). Credit 3. II**

Commutative rings; ideals and residue class rings; principal ideal rings; unique factorization rings; quadratic fields; fields of higher degree. Prerequisite: Math. 627.

**633. Group Representations. (4-0). Credit 4. I**

Representation theory of the rotation and the homogeneous Lorentz group. Prerequisites: Math. 415; approval of instructor.

**634. Group Representations. (3-0). Credit 3. II**

Equations invariant with respect to the rotation and Lorentz groups. Representation theory of inhomogeneous Lorentz groups. Lie algebras of simple groups and their representations. Composition and decomposition of representations of Lie algebras. Tensor analysis of simple Lie groups. Prerequisite: Math. 633.

**636. Topology. (3-0). Credit 3. II**

Axiomatic treatment of topological spaces. The metrization problem. Applications to arcs and curves. Prerequisite: Math. 607.

**638. Calculus of Variations. (3-0). Credit 3. II**

Theory and applications of methods of calculus of variations as applied to optimal problems. Prerequisite: Math. 601.

**639. Iterative Techniques. (3-3). Credit 4. I**

Iterative techniques for solving single equations, systems of equations, and eigenvalue problems. Prerequisite: Math. 615.

**641, 642. Modern Analysis. (4-0). Credit 4 each semester. I, II**

Recent developments in the theory of functions. Prerequisite: Math. 608.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

A course offered to enable students to undertake and complete with credit limited investigations not within their thesis research and not covered by any other courses in the curriculum. Prerequisite: Math. 601.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis or dissertation.

## Department of Mechanical Engineering

Professors Holdredge, Simmang (Head), Thompson, Truettner, Wingren; Associate Professors Caddess, Fletcher, Gaddis, Guthrie, Kozik, Perry; Assistant Professors Alter, Bagnall, Fontana, Noyes, Weiner, Wells; Instructors Brown, Gidson, Kranz, Stallings

**101. Engineering Problems. (0-3). Credit 1. I, II**

Introduction to elementary mechanics to include forces and force systems, units and dimensional equations, free body concept, motion and application of Newton's laws of motion. Prerequisites: Math. 102, and 103 or 116, or registration therein.

**212. Engineering Mechanics. (3-0). Credit 3. I, II, S**

Forces and couples, force systems, resultants, components, equilibrium, frame structures, center of gravity, and moment of inertia. Prerequisites: Math. 122 or 210 or registration therein; Phys. 218.

**222. Materials Science. (2-0). Credit 2. II**

Introduction to engineering materials and underlying theories that account for their behavior. Effects of tension, compression, bending, and thermal applications. Creep, fatigue, hardness, corrosion, and selected properties are stressed. Materials covered include metals, ceramics, plastics, and aggregates. Prerequisites: Chem. 102 or 104; registration in Phys. 220.

**309. Machine Production Techniques. (0-3). Credit 1. I, II, S**

Lecture demonstrations and practice in safety, care of machines and hand tools, shop organization, cutting speeds and feeds, standard machine tool work in metals, single point tool grinding, layout, drilling, tapping, shaping, turning, boring, threading and milling. Prerequisite: E.G. 105.

**310. Machine Production Techniques. (0-3). Credit 1. I, II, S**

Continuation of M.E. 309. Machining of metals with both standard and production machine tools. Manufacture of interchangeable parts, jigs, fixtures, and fixed gages. Prerequisite: M.E. 309.

**313. Engineering Mechanics. (3-0). Credit 3. I, II, S**

Continuation of M.E. 212, including kinematics, both graphical and algebraic solutions of relative linear velocities and accelerations, kinetics, dynamics of translation and rotation, work, energy, impact, momentum, and balancing. Prerequisite: M.E. 212.

**323. Thermodynamics. (4-0). Credit 4. I, II**

Thermodynamics of ideal and non-ideal gases, including non-flow and steady-flow processes; internal combustion engines; gas compressors; combustion; vapors and gas-vapor mixtures, boilers, and vapor cycles; general thermodynamic relations. Prerequisites: Math. 122 or 210; Phys. 219.

**327. Thermodynamics. (3-0). Credit 3. I, II, S**

Thermodynamics of gases, vapors, and liquids in various non-flow and steady-flow processes; internal combustion engines; gas compressors; power plant equipment; closed and open systems of various types. Prerequisites: Math. 122 or 210; Phys. 219.

**328. Thermodynamics. (3-0). Credit 3. I, II, S**

Continuation of M.E. 327, covering gas mixtures, variable specific heats, turbines, modern power plant cycles, combustion, refrigeration, air conditioning, non-ideal gases; general thermodynamic relations. Prerequisite: M.E. 323 or 327.

**337. Kinematic Drawing. (0-3). Credit 1. I**

Problems and drafting involving linkages, centros, relative linear velocities, cams and gears. Designed especially to supplement kinematics of motion included in course of dynamics. Prerequisite: M.E. 313 or registration therein.

**338. Kinematics and Machine Design. (2-3). Credit 3. I, II, S**

The kinematics is designed to accompany or follow the course in dynamics and to include analytical, graphical, and design applications of certain topics from dynamics. The machine design is designed to effect the transition from strength of materials to stress analysis and design of load bearing machine parts. Prerequisites: C.E. 305 and M.E. 313 or registration therein.

**340. Physical Metallurgy. (2-3). Credit 3. I, II, S**

Fundamentals of physical metallurgy; structure of matter; physical and mechanical properties; corrosion; metals and alloy systems; precipitation hardening; heat treatments of steels; stainless steels, light metals, copper alloys, and miscellaneous commercial alloys, metallurgy of fabrication methods. Laboratory includes demonstration and participation in metallographic techniques, physical testing, cold working and heat treatment. Prerequisites: C.E. 305 or registration therein; M.E. 222.

**344. Fluid Mechanics. (3-0). Credit 3. I, II, S**

Application of laws of statics, buoyancy, stability, energy, and momentum to behavior of ideal and real fluids. Study of dimensional analysis and similitude and their application to flow through ducts and piping, dynamic lift and related problems. Prerequisites: M.E. 313, and 323 or 327.

**346. Fluid Mechanics and Heat Transfer. (3-0). Credit 3. I, II**

Application of mechanics and thermodynamics to behavior of ideal and real fluids. Study of fundamental laws relating to heat flow. Prerequisites: M.E. 313, and 323 or 327.

**403. Engineering Laboratory. (1-3). Credit 2. I, II, S**

Study and calibration of instruments used in laboratory work and simple tests of engines, pumps, and flow devices. Engineering analysis and analog theory are stressed. Calculations and written reports on investigations and results obtained. Prerequisites: M.E. 323 or 327 and registration in M.E. 344 or Ch.E. 304.

**404. Engineering Laboratory. (1-3). Credit 2. I, II, S**

Continuation of M.E. 403 with more advanced work with analog computer and in analysis of steam and internal combustion engines, turbines, fans, refrigeration machinery, pumps, and various flow devices. Prerequisites: E.E. 331; M.E. 328, 344, 403.

**409. Structure and Properties of Alloys. (2-3). Credit 3. I**

Continuation and intensification of subject matter of M.E. 340. Laboratory exercises include metallographic studies and heat treatments by individual students. Prerequisite: M.E. 340.

**410. Internal Combustion Engines. (3-0). Credit 3. I, II**

Thermodynamics of cycles for internal combustion engines and gas turbines, including fuels and combustion. Performance characteristics of various types of engines. Prerequisite: M.E. 323 or 327.

**414. Steam and Gas Turbines. (3-0). Credit 3. I**

Analysis of gas turbine cycles, high speed gas flow, turbine and compressor kinematics and thermodynamics; study of steam turbines and of special cycles. Prerequisites: M.E. 328, 344.

**417. Power Engineering. (3-0). Credit 3. I, II, S**

Application, operation, and performance of all types of power plant equipment. Selection and arrangement of such equipment from standpoint of economics. Prerequisites: M.E. 328, 461.

**432. Automotive Engineering. (3-0). Credit 3. II**

The modern automobile, its power plant, fuels, performance, vibration, dynamic balancing, electrical equipment, braking systems, and construction from engineering standpoint. Prerequisites: M.E. 313, and 323 or 327.



**436. Air Conditioning and Refrigeration. (3-0). Credit 3. II**

Application of principles of thermodynamics to equipment and methods of practical production of refrigeration. Thermodynamics of conditioning air. Selection of equipment, piping, and duct layouts for heating, ventilating, and air conditioning. Prerequisite: M.E. 323 or 328.

**445. Machine Design. (2-3). Credit 3. I, II**

Theory and practice of machine design applied to various machine parts, such as columns, screws, shafts (considering combined stresses), bearings, brakes, springs, and complete machines. Prerequisites: M.E. 310, 338, 340.

**446. Machine Design. (2-3). Credit 3. I, II**

Theory and practice of machine design applied to problems encountered in transmission of power by means of belts, chains, and gears. Prerequisite: M.E. 445 or registration therein.

**457. Engineering Analysis. (3-0). Credit 3. II**

Mathematical and experimental methods of solving problems in various fields of engineering. Dimensional analysis, representation and analysis of experimental data, graphical and numerical solution of differential equations, analogies and computers. Prerequisites: Math. 308; senior classification in engineering.

**459. Mechanical Vibration. (3-0). Credit 3. I, II, S**

Basic theory of vibrating systems with single and multiple degrees of freedom and principles of transmission and isolation of vibrations. Prerequisites: Math. 308; M.E. 313.

**461. Heat Transfer. (3-0). Credit 3. I, II, S**

Study of conduction, convection, and radiation separately and in combination; steady and unsteady states; mathematical treatments; graphical and numerical solutions, dimensional analysis. Prerequisites: Math. 308; M.E. 344.

**481. Seminar. (0-2). Credit 1. I, II**

Oral presentation of selected topics from current literature of the field. Technical films showing practical application of theories of engineering and manufacturing processes. Lectures from industrial representatives. Prerequisite: Senior classification.

**485. Advanced Problems in Mechanical Engineering. Credit 1 to 6. I, II, S**

Special problems in various phases of mechanical engineering assigned to individual students or to groups. Readings assigned, and frequent consultations held. Prerequisites: By permission and senior classification in mechanical engineering.

**599. Mechanics for College Teachers: Statics. (4-0). Credit 4. S**

Forces and couples, force systems, resultants, components, equilibrium, frame structures, center of gravity, moment of inertia, graphical methods, teaching techniques in both analytical and vector methods; associated seminar. Prerequisites: Graduate classification; approval of the Heads of the Education and Mechanical Engineering Departments.

**FOR GRADUATES****600. Mechanics for College Teachers: Dynamics. (3-0). Credit 3. S**

Kinematics of absolute and relative displacement, velocity, and acceleration by graphical, algebraic, and vector methods to include Coriolis' component; kinetics and dynamics of translation and rotation, work, energy, impact, momentum, balancing; teaching techniques, associated seminar. Prerequisites: Math. 685 (2 hours); M.E. 599.

**601. Advanced Machine Design. (4-0). Credit 4. II**

Study of special design problems in mechanical engineering such as design of piping systems subjected to thermal expansion, theory of lubrication, curved beams and flat plates. Prerequisites: Math. 308; M.E. 445 or equivalent.

**603. Power Plants. (4-0). Credit 4. II**

Design of central and isolated power plants with special attention to over-all economic operation. Prerequisite: M.E. 417.

**605. Engineering Analysis. (4-0). Credit 4. I, S**

Study of analytical, graphical, and approximate methods of solving problems common to engineering; dimensional analysis and model study; design of experiments; statistical analysis and interpretation of test data including derivation of empirical equations. Prerequisite: Math. 308.

**613. Engineering Dynamics. (4-0). Credit 4. II**

Study of dynamics of particles and of rigid bodies; virtual work principle, Lagrange's and Euler's equations of motion, and Hamilton's principle applied to engineering problems. Prerequisites: Math. 601; M.E. 313.

**615. Advanced Engineering Thermodynamics. (4-0). Credit 4. I**

Theories of thermodynamics and their application to more involved problems in engineering practice. Second law analysis and statistical theory emphasized. Prerequisite: M. E. 328.

**616. Heat Transmission. (4-0). Credit 4. II**

Fundamental laws relating to heat flow, application of these laws to engineering materials used in various industrial processes; study of recent developments by reference to current literature. Prerequisites: Math. 601; M.E. 605.

**617. Mechanical Vibrations. (4-0). Credit 4. I, S**

Theory of vibrations of machines and structures. Vibration of elastic bodies and of non-linear systems. Prerequisites: Math. 308; M.E. 313.

**618. Advanced Air Conditioning. (4-0). Credit 4. II**

Thermodynamics of air-vapor mixtures as applied to air conditioning. Design and selection of equipment with emphasis on system planning, air distribution, controls, noise and vibration elimination, costs and economics. Prerequisite: M.E. 436.

**620. Experimental Stress Analysis. (3-3). Credit 4. I**

Study of photoelasticity, electric strain gages, stresscoat. Prerequisite: Math. 308 or registration therein.

**621. Fluid Mechanics. (4-0). Credit 4. I**

Study of dynamics of two-dimensional incompressible and compressible fluids. Viscous flow in laminar and turbulent layers, the Navier-Stokes equations, boundary layer theory and applications to turbomachinery are stressed.

**626. Lubrication Theory. (3-0). Credit 3. II**

Development of Reynolds equation from Navier-Stokes equation for study of hydrodynamic lubrication theory as basis for bearing design. Application to simple thrust and journal bearings and pads of various geometries. Study of hydrostatic lubrication, floating ring bearing, compressible fluid (gas) lubrication, grease lubrication, dynamically loaded bearings, half speed whirl and stability. Prerequisites: Math. 308; M.E. 344 or equivalent.

**627. Heat Transfer-Conduction. (3-0). Credit 3. I**

Mathematical theory of steady-state and transient heat conduction; solution of the governing differential equations by analytical, graphical and analogical methods; applications to various geometric configurations. Prerequisites: Math. 601 or registration therein; M.E. 461.

**628. Heat Transfer-Convection. (3-0). Credit 3. II**

Mathematical theory of convection energy transport, combined mass and heat transfer; solution of the governing equation by analytical, numerical, and analogical methods; applications to the design of heat-transfer apparatus are included. Prerequisite: M.E. 627.

**629. Heat Transfer-Radiation. (2-0). Credit 2. I**

Mathematical theory of thermal radiation with applications; ideal and non-ideal radiating surfaces, heat transfer in enclosures, solar radiation; analytical, numerical, and analogical methods stressed in problem solving. Prerequisite: M.E. 627 or registration therein.

**631. Jet Propulsion. (4-0). Credit 4. I**

Study of fluid mechanics and thermodynamics of turboprop engines, ramjets, turbojets, rocket motors, and electric propulsion systems. Where applicable, analysis of performance of these systems will be made. Prerequisites: Graduate classification in engineering; approval of Department Head.

**640. Ferrous Metallurgical Design. (3-3). Credit 4. II**

A detailed study of the phase transformations in steel, the resulting changes in mechanical properties, the peculiarities of the steels, and their influence upon the design of machine elements. Prerequisites: M.E. 340, 409 or its equivalent.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Content will be adapted to interest and needs of group enrolled.

**691. Research. Credit 1 or more each semester. I, II, S**

Methods and practice in mechanical engineering research for thesis or dissertation. (See S.M. 601, 602, 603, 604, 605, 606, 607, 608, and 609 for description of related courses.)

### Department of Meteorology

Professors Byers (Head), Clayton, Moyer; Associate Professors Brundidge, Clark, Franceschini, Griffiths, Huebner, Thompson; Assistant Professor Henry; Instructors Cobb, McDaniel; Lecturer Graves

**302. Weather Reports and Forecasting. (3-0). Credit 3. I**

Global weather reporting, codes and data transmission, radio-facsimile weather maps; features of circulation; synoptic weather analysis; avoiding storms at sea. (For students in Texas Maritime Academy.)

**305. General Meteorology. (3-0). Credit 3. I, II**

Introductory course in composition, structure, and behavior of atmosphere. Emphasis on fundamental processes and descriptions. Prerequisites: Registration in Math. 307; Phys. 202 or 219.

**315. Meteorological Instruments and Observations. (3-3). Credit 4. I, II**

Design and accuracy of meteorological instruments; weather observations and codes; data transmission; meteorological charts and diagrams; plotting and analysis of data. Prerequisites: Math. 121 or 209; Phys. 202 or 219.

**324. Physical and Regional Climatology. (3-0). Credit 3. I, II**

Climatic causes; classification and geographical distribution of climates; long-term climatic variations; study of effects of climate on life. Prerequisite: Met. 305 or approval of instructor.

**335. Atmospheric Statics and Thermodynamics. (2-0). Credit 2. I, II**

Thermodynamics of dry, moist, and saturated air applied to atmospheric analysis; thermodynamic diagrams; hydrostatic equilibrium and stability. Prerequisites: Math. 122 or 210; Phys. 202 or 219.

**336. Atmospheric Motions. (3-0). Credit 3. II, S**

Kinematics; conservation equations; equations of motion; geostrophic and accelerated motion; streamlines; trajectories; circulation and vorticity theorem; wave dynamics. Prerequisites: Math. 307; Met. 335.

**425. Methods in Climatology. (3-3). Credit 4. I, II**

Sampling and analysis of time series of atmospheric parameters; objective forecasting; punched card techniques; significance and limitations of results. Prerequisite: Met. 324 or approval of instructor.

**435. Dynamic Meteorology. (3-0). Credit 3. I**

Continuation of Met. 336. Application of vorticity equation; movement of barotropic and baroclinic systems; numerical weather prediction; energy transformation. Prerequisites: Math. 308; Met. 336.

**445. Atmospheric Physical Processes. (3-0). Credit 3. I, S**

Physics of heat, moisture, and momentum transfer; radiation, evaporation, condensation, advection, convection, turbulence, and diffusion; their consequences upon weather. Prerequisite: Met. 336.

**446. Physical Meteorology. (3-0). Credit 3. I, II, S**

Fog, cloud, and precipitation physics; thunderstorms; atmospheric electricity; atmospheric optical and acoustical phenomena. Prerequisite: Met. 445.



**451. Fundamentals of Meteorological Analysis. (1-9). Credit 4. II, S**

Principles and techniques of synoptic weather analysis in three dimensions; detailed studies of structure and development of extratropical weather systems. Prerequisite: Met. 336 or registration therein.

**452. Weather Analysis and Prognosis. (1-6). Credit 3. I, S**

Continuation of Met. 451, with study of time continuity and vertical consistency; tropopause and jet streams; major and minor waves; short- and long-range prognostic techniques. Prerequisite: Met. 451.

**453. Synoptic Meteorology. (1-6). Credit 3. I, II, S**

Continuation of Met. 452, with emphasis on interpretation of weather events from analyzed and prognostic charts; current weather forecasting and briefing. Prerequisite: Met. 452.

**465. Agricultural Meteorology. (2-0). Credit 2. I**

Study of principles of meteorology as related to agriculture, with special emphasis upon climate of surface layer of atmosphere. Prerequisite: Approval of instructor.

**467. Marine Meteorology. (3-0). Credit 3. II**

Interactions between sea and air; energy budget and exchange processes; climatology of global exchanges and restricted area applications. Prerequisite: Approval of instructor.

**475. Radar Meteorology. (3-0). Credit 3. I, II**

Study of theory and practice of radar storm observations. Prerequisite: Met. 445.

**479. Military Applications of Meteorology. (3-0). Credit 3. I, II**

Applications of meteorological knowledge and data to related activities and problems in national defense not under security classification. Prerequisite: Met. 451.

**481. Seminar. (1-0). Credit 1. II**

Presented by students and based upon surveys of the literature.

**485. Problems. Credit 1 to 3. I, II, S**

Offered to enable majors in meteorology to undertake and complete with credit in their particular fields of specialization limited investigations not covered by any other courses in established curriculum.

**FOR GRADUATES****600. Survey of Meteorology. (3-0). Credit 3. II, S**

Survey course in meteorology designed for teachers of secondary school science. Prerequisite: Approval of Heads of Departments of Meteorology and of Education and Psychology.

**615. Instrument Theory and Design. (3-0). Credit 3. II**

Study of modern methods of instrumentation as related to meteorology and allied geophysical fields; their basic concepts, design, use, and inherent errors. Prerequisite: Bachelor of Science degree in science or engineering.

**625. Applied Climatology. (3-0). Credit 3. I**

Practical applications of climate to other disciplines and study of methods used for this coordination. Prerequisite: Met. 425 or approval of instructor.

**636. Dynamic Meteorology. (3-0). Credit 3. II**

Perturbation theory and applications to barotropic and baroclinic systems; current literature topics. Prerequisites: Math. 601; Met. 435. (Offered in 1965-66 and in alternate years thereafter.)

**637. Numerical Weather Prediction. (3-0). Credit 3. I**

Numerical solution of hydrodynamical relationships; modeling, smoothing, and filtering; stability; accuracy of solutions. Prerequisites: Math. 417; Met. 435.

**638. Meteorological Simulation. (2-6). Credit 4. II**

Uses of analog computers in research; laboratory practice using general purpose analog computer; application to other disciplines as well as meteorology. Prerequisites: Math. 308; approval of instructor.

**645. Cloud and Precipitation Physics. (3-0). Credit 3. I**

Physics of clouds and precipitation; convection theories; homogeneous and heterogeneous nucleation; precipitation processes, atmospheric electricity; artificial modification. Prerequisite: Met. 446.

**647. Meteorology of the Upper Atmosphere. (3-0). Credit 3. I**

Effects of solar system astrophysical processes and properties on extratropospheric terrestrial atmosphere; composition, structures, and characteristic phenomena. Prerequisite: Bachelor of Science degree in science or engineering.

**648. Cosmic Meteorology. (3-0). Credit 3. II**

Continuation of Met. 647. Properties and processes of interplanetary medium; atmospheres of other planets; cosmological implications in planetary environments. Prerequisite: Met. 647.

**657. Mesometeorology. (2-6). Credit 4. II**

Theory and analysis of mesoscale weather systems; relationship of mesoscale systems to larger and smaller scale systems. Prerequisite: Met. 453 or approval of instructor.

**658. Synoptic Meteorology. (2-6). Credit 4. I**

Examination of procedures for analyzing and forecasting macroscale atmospheric structure; detailed studies of specific phenomena; recent developments. Prerequisite: Met. 453 or approval of instructor.

**665. Micrometeorology. (3-0). Credit 3. I**

Earth-atmosphere interface processes with special emphasis on exchange concepts and resulting modifications to wind, temperature, and moisture. Prerequisites: Math. 308; Met. 445. (Offered in 1966-67 and in alternate years thereafter.)

**666. Agricultural Meteorology. (3-0). Credit 3. II**

Application of physical concepts of meteorology to problems arising in agriculture, with detailed study of meso- and micro-climates. Prerequisite: Met. 465, or approval of instructor.

**674. Radar Meteorology. (3-0). Credit 3. II**

Theoretical considerations of principles of electromagnetic propagation; radar applications in cloud physics research. Prerequisites: Math. 601; Met. 475. (Offered in 1966-67 and in alternate years thereafter.)

**676. Hydrometeorology. (3-0). Credit 3. II**

Role of weather and weather processes in land water problems. Prerequisite: Approval of instructor.

**681. Seminar. (2-0). Credit 2. II, S**

Presented by students and based upon their research work and upon surveys of the literature.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Offered to enable majors in meteorology to undertake and complete with credit in their particular fields of specialization limited investigations not covered by any other courses in established curriculum.

**691. Research. Credit 1 or more each semester. I, II, S**

For thesis or dissertation. Topic subject to approval of Department Head.

## Department of Military Science

### UNITED STATES ARMY

Professor: Col. Baker (Head); Associate Professors: Lieutenant Colonel Brooks; Majors Harber, Kirmse, Westphal, Zipp; Assistant Professors: Captains Duker, Miller, Simmons, Traas

### Basic Course of Military Science

**121. First Year Military Science. (0-2). Credit 1. I**

Individual weapons and marksmanship: Introduction to marksmanship training, fundamentals of this training, safety principles, and good shooting habits. Organization of Army and ROTC: Providing understanding of Army and orientation on ROTC.

**Leadership laboratory:** Leadership training, drill experience, and development of characteristics of leadership through progressive training in drill and command.

**122. First Year Military Science. (0-2). Credit 1. II**

**U. S. Army and National Security:** Providing understanding of missions and responsibilities of U. S. Army as member of National Defense Team and emphasizing cadet's personal responsibility as citizen and leader. **Leadership laboratory:** Continuation of M.S. 121.

**221. Second Year Military Science. (0-3). Credit 1. I**

**American military history:** Providing survey of American military history from origin of U. S. Army to present with emphasis on factors which led to organizational, tactical, logistical, operation, strategical, social, and similar patterns found in present-day Army. **Introduction to counter-insurgency operations.** **Leadership laboratory:** Progressive leadership training in drill and command emphasizing functions, duties, and responsibilities of junior leaders (Squad leaders, guidon bearers and platoon sergeants).

**222. Second Year Military Science. (0-3). Credit 1. I, II**

**Map and aerial photograph reading:** Application of basic principles of map reading emphasizing terrain appreciation and evaluation, marginal information, military and topographic map symbols, methods of orientation and resection, military grid reference systems, classes of aerial photography. **Introduction to operations and basic tactics:** Review of organization of basic military teams and understanding of duties, responsibilities, and methods of employment of basic military units. **Leadership laboratory:** Continuation of M.S. 221.

**Advanced Course of Military Science**

**321. First Year Advanced Military Science. (3-1). Credit 3. I**

**Leadership:** Responsibilities and basic qualities of a leader, human behavior, and adjustment of Army life, objectives of leadership principles, leadership techniques, functions of leader and special problems of military leadership. **Branches of the Army:** Orientation on role of various branches of Army and their function in overall mission of Army. **Military teaching principles:** Developing understanding of principles, methods, and techniques fundamental to military instruction, and providing opportunities for cadet to develop skill in preparation, presentation, and evaluation of instruction. **Counterinsurgency:** Acquaint the student with function, operations and training. **Leadership laboratory:** Special attention given to further developing leadership potential by encouraging Advanced Course cadets to participate in planning and conducting of drills and ceremonies.

**322. First Year Advanced Military Science. (3-1). Credit 3. II**

**Small unit tactics and communications:** Review and application of principles of offensive and defensive combat to units of infantry division battalion; conduct of counterinsurgency and guerrilla warfare training; familiarization of principles of communications. **Familiarizing cadets with administrative procedures and general conduct of training at ROTC Summer Camp.** **Leadership laboratory:** Continuation of M.S. 321.

**421. Second Year Advanced Military Science. (3-1). Credit 3. I**

**Army administration:** Providing cadet with basic concepts and fundamentals of Army administration and mess management. **Operations:** Providing understanding of staff organizations, using division staff as model; staff duties; forms; records; reports; and orders of staff. **Logistics:** Providing cadet with fundamental knowledge of supply and movement of small units. **Leadership laboratory:** Drill and command with emphasis placed on cadet's responsibility as leader.

**422. Second Year Advanced Military Science. (3-1). Credit 3. II**

**Military Law:** Introducing cadet to fundamental concepts of military justice in Armed Forces of U. S., and teaching basic principles and methods of procedures for cases. **Role of U. S. in world affairs:** Preparing future officer for active service by orientation in geographical and economic factors, their influence on division of peoples into nations, and causes of wars. **Service orientation:** Providing senior cadet an orientation on service life for future officers. **Map reading:** Review of principles of maps and aerial photograph reading in order to further prepare cadet for attendance at Officer Branch Basic Course upon his entry on active duty. **Leadership laboratory:** Continuation of M.S. 421.

**NOTE:** During the First Year of Basic Military Science, 30 contact hours of an acceptable academic



subject will be substituted for a like number of military subject contact hours. (Normally this subject will be English 103.)

In both the First and Second Years of Advanced Military Science, 45 contact hours of an acceptable academic subject will be substituted for a like number of military subject contact hours. Since the academic subject substituted depends on the individual cadet's academic major, the Military Science Department will assign each subject to the cadet at the time of registration.

## Department of Modern Languages

Professors Breitenkamp, Dabbs (Head), Skrivane, Woolket; Assistant Professor Elmquist; Instructors Bottino, Gottschalk, Kent, Mayeux, Mosley, Quinn, Stroud

Foreign languages, in addition to their unquestioned cultural value, have a utilitarian value of great importance for those expecting to engage in research or purely practical pursuits. It is, therefore, advisable when possible for students to take up such a language during their undergraduate studies and thereby have the use of it when they begin advanced work in agriculture, engineering, or in pure science. Otherwise, as often happens, their specialization may be hampered or delayed. A language laboratory is available for those interested in developing a command of the spoken language.

### 100. Spoken English for Foreign Students. (3-0). Credit 3. I, II, S

Intensive class drill; individual laboratory work in comprehension, and practice in correct pronunciation by means of tape recordings; study of idiomatic and colloquial expressions.

### 101. Beginning French. (3-0). Credit 3. I

Study of standard elementary grammar with oral and reading exercises; early attention given to background for conversation. One half of class preparation will be done in language laboratory.

### 102. Beginning French. (3-0). Credit 3. II

Continuation of M.L. 101. Exercises designed to develop conversational ability. One half of class preparation will be done in language laboratory. Prerequisite: M.L. 101 or equivalent.

### 103. Beginning German. (3-0). Credit 3. I, II, S

Study of standard elementary grammar with emphasis on modern usage; elementary readings begun at mid-semester; elementary conversation. One half of class preparation will be done in language laboratory.

### 104. Beginning German. (3-0). Credit 3. I, II, S

Continuation of M.L. 103. Exercises designed to develop conversational ability. One half of class preparation will be done in language laboratory. Prerequisite: M.L. 103 or equivalent.

### 105. Beginning Spanish. (3-0). Credit 3. I, II, S

For beginners. Standard elementary grammar with oral and reading exercises; early attention given to background for conversation. One half of class preparation will be done in language laboratory.

### 106. Beginning Spanish. (3-0). Credit 3. I, II, S

Continuation of M.L. 105. Extensive written and oral exercises. Oral exercises designed to develop conversational ability. Part of class preparation will be done in language laboratory. Prerequisite: M.L. 105 or equivalent.

### 109. Beginning Russian. (3-0). Credit 3. I

Study of standard elementary grammar with oral, written, and reading exercises; early attention given to background for conversation. A certain amount of class preparation will be done in language laboratory.

### 110. Beginning Russian. (3-0). Credit 3. II

Continuation of M.L. 109; continued study of elements of grammar; oral exercises. Part of class preparation will be done in language laboratory. Prerequisite: M.L. 109 or equivalent.

### 127. Beginning Czech. (3-0). Credit 3. I, II

Study of standard elementary grammar with oral, written, and reading exercises. Laboratory available for class preparation.

**201. Intermediate French. (3-0). Credit 3. I**

French readings of average difficulty; advanced conversation with composition. One half of class preparation will be done in language laboratory. Prerequisite: M.L. 102 or equivalent.

**202. Intermediate French. (3-0). Credit 3. II**

Continuation of M.L. 201 with increased conversational material. One half of class preparation will be done in language laboratory. Prerequisite: M.L. 201 or equivalent.

**203. Intermediate German. (3-0). Credit 3. I, II**

Introduction to German readings of average difficulty. Review of grammar; composition; practice in conversation. Prerequisite: M.L. 104 or equivalent.

**204. Intermediate German. (3-0). Credit 3. I, II**

Continuation of M.L. 203 with increased conversational material. Some scientific selections included in class readings. Prerequisite: M.L. 203 or equivalent.

**205. Intermediate Spanish. (3-0). Credit 3. I, II**

Completion of grammar study, followed by intensive practice. Part of class preparation will be done in language laboratory. Prerequisite: M.L. 106 or two years of high-school Spanish.

**206. Intermediate Spanish. (3-0). Credit 3. I, II**

Continuation of M.L. 205. Readings of standard literary works. Part of class preparation will be done in language laboratory. Prerequisite: M.L. 205 or equivalent.

**209. Intermediate Russian. (3-0). Credit 3. I**

Review of grammar; selected readings based on everyday subjects; supplementary material to develop self-expression and recognition ability. Prerequisite: M.L. 110 or equivalent.

**210. Intermediate Russian. (3-0). Credit 3. II**

Continuation of M.L. 209. Readings taken from standard works. Prerequisite: M.L. 209 or equivalent.

**301. French Literature to 1800. (3-0). Credit 3. I**

Survey of French literature to end of eighteenth century. Selected readings; main literary currents of period. Class lectures in French. Assigned readings and topics for class reports. Prerequisite: Twelve hours of French or equivalent.

**302. French Literature, 1800 to the Present. (3-0). Credit 3. II**

Survey of nineteenth and twentieth centuries. Readings from representative authors; main literary currents of period. Lectures and class reports in French. Prerequisite: Twelve hours of French or equivalent.

**303. Classical German Literature. (3-0). Credit 3. I**

Study of classical period of German literature, including works of Lessing, Schiller, and Goethe. Reports and term papers. Prerequisite: M.L. 204 or approval of Department Head.

**304. Twentieth Century German Literature. (3-0). Credit 3. II**

Study of twentieth-century German literature. Selected works by representative writers. Reports and term papers. Prerequisite: M.L. 204 or approval of Department Head.

**305. Modern Spanish-American Drama. (3-0). Credit 3. I**

Study of representative contemporary plays of Mexico. Economic, social, and cultural background of Spanish American republics. Conducted largely in Spanish. Written reports in Spanish; term papers. Prerequisite: M.L. 206 or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**306. Modern Spanish-American Drama. (3-0). Credit 3. II**

Continuation of M.L. 305. Authors and plays of South America. Prerequisite: M.L. 206 or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**309. Advanced Russian. (3-0). Credit 3. I**

Selections from Russian literature and scientific publications. Special attention to participial constructions; complex sentences. Conversation practice. Laboratory for oral preparation. Prerequisite: M.L. 210 or approval of Department Head.

**310. Advanced Russian. (3-0). Credit 3. II**

Continuation of M.L. 309. Selections from current literary, journalistic, and scientific periodicals. Partly conducted in Russian. Laboratory for advanced conversation. Prerequisite: M.L. 309 or approval of Department Head.

**325. Public Speaking in Spanish. (1-2). Credit 2. I**

Training in preparation and delivery of talks in Spanish. Talks are recorded for remedial work in laboratory. Prerequisite: Completion of any 300 course in Spanish, or approval of Department Head.

**326. Public Speaking In Spanish. (1-2). Credit 2. II**

Continuation of M.L. 325 with round-table discussions and impromptu speeches. Prerequisite: Completion of any 300 course in Spanish, or approval of Department Head.

**335. Spanish-American Novel. (3-0). Credit 3. I**

Study of representative contemporary novels of Mexico. Term papers in Spanish. Prerequisite: M.L. 206 or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**336. Spanish-American Novel. (3-0). Credit 3. II**

Continuation of M.L. 335. Authors and novels of South America. Prerequisite: M.L. 206 or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**381. Readings in French. Credit 1 or 2. I, II**

Individual supervision of readings. Written and oral reports and semester examination; no class meetings. Prerequisites: Nine hours of French; junior classification; approval of Department Head.

**382. Readings in French. Credit 1 to 3. II**

Individual supervision of readings selected for each student separately. Written and oral reports and a semester examination; no class meetings. Prerequisites: Nine hours of French; junior classification; approval of Department Head. (Offered in 1965-66 and in alternate years thereafter.)

**383. Readings in German. Credit 1 to 3. I, II**

Individual supervision of readings selected for each student separately. Written and oral reports and semester examination; no class meetings. Prerequisites: Nine hours of German; junior classification; approval of Department Head.

**384. Readings in German. Credit 1 to 3. II**

Individual supervision of readings selected for each student separately. Written and oral reports and a semester examination; no class meetings. Prerequisites: Nine hours of German; junior classification; approval of Department Head. (Offered in 1965-66 and in alternate years thereafter.)

**387. Readings in Czech. Credit 1 to 3. I, II**

Individual supervision of readings selected for each student separately. Written and oral reports and a semester examination; no class meetings. Prerequisites: Two years of high-school Czech or equivalent; junior classification; approval of Department Head.

**388. Readings in Czech. Credit 1 to 3. II**

Individual supervision of readings selected for each student separately. Written and oral reports and a semester examination; no class meetings. (Offered in 1965-66 and in alternate years thereafter.) Prerequisites: Two years of high-school Czech; one year of college Czech or equivalent; approval of Department Head.

**389. Readings in Russian. Credit 1 to 3. I**

Individual supervision of readings selected for each student separately. Written and oral reports and a semester examination; no class meetings. (Offered in 1965-66 and in alternate years thereafter.) Prerequisites: Junior classification; nine hours of Russian; approval of Department Head.

**390. Readings in Russian, Continued. Credit 1 to 3. II**

Individual supervision of readings selected for each student separately. Written and oral reports and a semester examination; no class meetings. Prerequisites: Junior classification; nine hours of Russian; approval of Department Head. (Offered in 1965-66 and in alternate years thereafter.)



**405. Spanish Literature to 1700. (3-0). Credit 3. I**

Origins of Spanish literature, literary movements, leading writers. Class readings of selected examples of literary types. Written reports on outside reading. Prerequisite: Six hours of 300-level courses in Spanish or equivalent.

**406. Spanish Literature, 1700 to the Present. (3-0). Credit 3. II**

Literary movements since 1700. Introduction to best-known writers and their works. Reports in Spanish. Prerequisite: Six hours of 300-level courses in Spanish or equivalent.

**425. Teaching of Spanish. (3-0). Credit 3. I, II**

Intensive review of Spanish grammar and phonetics, emphasizing those aspects needed in teaching elementary courses in Spanish; written translation exercises; use of language laboratory as teaching aid. Prerequisites: Twenty-one hours of Spanish or equivalent; approval of Department Head.

**FOR GRADUATES****601. Introduction to Scientific French. (3-0). Credit 3. S**

Intensive course to prepare graduate students to read scientific material with sufficient adequacy to pass foreign-language examination requirement for the Ph.D. degree. Technical vocabulary and translation.

**602. Readings in Scientific French. (3-0). Credit 3. S**

Continuation of M.L. 601. Reading and translation of material relating to various sciences. Designed to develop technical vocabulary and facility in reading scientific French. Prerequisite: M.L. 601 or approval of Department Head.

**603. Introduction to Scientific German. (3-0). Credit 3. I, S**

Intensive course to prepare graduate students to read scientific material with sufficient adequacy to pass foreign-language examination requirement for the Ph.D. degree. Technical vocabulary and translation.

**604. Readings in Scientific German. (3-0). Credit 3. II, S**

Continuation of M.L. 603. Translation of material relating to various sciences. Designed to develop technical vocabulary and facility in reading scientific German. Prerequisite: M.L. 603 or approval of Department Head.

**609. Introduction to Scientific Russian. (3-0). Credit 3. I, S**

Intensive course to prepare graduate students to read scientific material with sufficient adequacy to pass foreign-language examination requirement for the Ph.D. degree. Technical vocabulary and translation.

**610. Readings in Scientific Russian. (3-0). Credit 3. II, S**

Continuation of M.L. 609. Selected material relating to various sciences. Designed to develop technical vocabulary and facility in reading scientific Russian. Prerequisite: M.L. 609 or approval of Department Head. Intended for Ph.D. candidates.

**Department of Naval Science****UNITED STATES NAVY**

Associate Professor: Lieutenant Hale (Head); Assistant Professors: Lieutenants (jg) Hogan, Sanders; Instructors Anderson, Berryman, Bryant, Gann

The Naval Science Department administers prescribed naval subjects within academic standards set by the Chief of Naval Personnel. Each cadet who completes the Naval Science courses and is otherwise qualified becomes eligible for, and may be granted, an inactive commission as Ensign, U. S. Naval Reserve, upon graduation.

The objectives of the Naval Science Department are to provide the cadet with a well-rounded course in basic naval subjects; to develop an understanding of naval science and a knowledge of naval practice; and to develop, by precept and example, the psychology and technique of leadership.

Courses are offered at the Galveston campus of the Texas Maritime Academy only.

**109. Orientation and Sea Power. (0-2). Credit 1. I**

Study of naval organization, customs, traditions, standard shipboard organization, types and characteristics of naval vessels, and elements of various types of naval warfare.

**110. Orientation and Sea Power. (0-2). Credit 1. II**

Continuation of N.S. 109.

**209. Sea Power. (3-0). Credit 3. I**

Stimulates interest in naval history and appreciation of contribution of sea power to past, present, and future progress of United States, stressing influence of sea power on global history.

**210. Naval Weapons. (3-0). Credit 3. II**

Introduction to naval weapons to familiarize cadet with nomenclature and types of weapons in use today. Includes explosives, armor, guns and gun mounts, power drives, basic principles of rockets and guided missiles, fire control; radar and CIC, anti-submarine warfare, and introduction to space technology and nuclear warfare.

**309. Naval Machinery. (3-0). Credit 3. I**

Offered to deck cadets to afford basic understanding of ship stability, naval engineering including main propulsion plants (steam, nuclear, and internal combustion) with emphasis being placed upon fundamental principles. Familiarizes cadet with entire shipboard engineering plant, and with administration and organizational concepts in field of naval engineering.

**310. Naval Operations. (3-0). Credit 3. II**

Acquaint student with shipboard operations such as relative motion, tactical communications and instructions, and rules of nautical road so that he may qualify in bridge and CIC watch billets afloat with minimum additional training.

**311. Navigation. (2-2). Credit 3. I**

Offered to engineer cadets to enable cadet to acquire understanding of theory and technique of terrestrial and celestial navigation.

**410. Principles of Naval Leadership. (3-0). Credit 3. II**

Built upon foundation of U. S. Navy General Order No. 21 which defines naval leadership as art of accomplishing Navy's mission through people, based on three precepts: personal example, good management practice, and moral responsibility.

## **Department of Nuclear Engineering**

Professor Cochran (Head); Associate Professor Gibson; Assistant Professors Emon, Kohler; Instructor Simek

**401. Nuclear Engineering. (3-0). Credit 3. I**

Nuclear reactions and concepts fundamental to reactor engineering. Prerequisite: Senior classification.

**402. Industrial Applications of Radioisotopes. (2-3). Credit 3. II**

Interaction of radiation with matter. Behavior of various nuclear radiation detectors studied both theoretically and experimentally in laboratory. Properties of radioisotopes useful to industry are considered and evaluated from engineering point of view. Prerequisites: Math. 308; senior classification.

**404. Nuclear Engineering. (3-0). Credit 3. II**

An introduction to neutron diffusion theory as applied to nuclear reactors. Conditions for criticality and control of fission process. Elements of radiation production, shielding and heat generation in nuclear reactor. Prerequisites: Math. 308; N.E. 401.

**409. Radiological Safety. (2-0). Credit 2. I, II, S**

Lectures and demonstrations concerning interactions of nuclear radiations with matter and biological systems. Emphasis given to theory and practice of radiation dosimetry as applied to radiation protection. Prerequisites: Math. 307; Phys. 220; or approval of instructor.

## FOR GRADUATES

**601. Nuclear Reactor Analysis. (3-0). Credit 3. I**

Neutron balance and cycle. Neutron slowing-down and diffusion in finite systems. Fermi Age and multigroup criticality for bare, homogeneous cores. Reflected homogeneous and heterogeneous reactor. Reactor kinetics. Prerequisites: Math. 308, 601 or registration therein.

**602. Nuclear Reactor Analysis. (4-0). Credit 4. II**

Introductory transport theory, multigroup slowing-down diffusion theory for bare and reflected cores, thermal utilization, resonance escape, fast fission, heterogeneous lattices, temperature coefficients, control rods, reactor kinetics and perturbation theory. Prerequisites: Math. 601; N.E. 601.

**605. Nuclear Measurements Laboratory. (2-3). Credit 3. I**

Basic techniques of nuclear measurements discussed and practiced. Behavior of neutrons in multiplying and nonmultiplying media observed. Extensive use made of nuclear reactor. Prerequisite: N.E. 601 or registration therein.

**606. Reactor Experimentation. (2-3). Credit 3. II**

Extension of N.E. 605. Control rod and power calibrations are performed. Effects of scattering, absorption, and moderation on the reactor are determined. Reactor core is disassembled and a critical experiment performed. Prerequisites: N.E. 602 or registration therein; N.E. 605.

**608. Thermonuclear Engineering. (3-0). Credit 3. I, S**

Fundamentals relative to use of fusion reaction as energy source. Transport theory for ionized gases. Liouville and Boltzmann equations. Macroscopic conservation laws and magnetohydrodynamics. Instabilities. Confinement and heating problems. Diagnostics.

**610. Design of Nuclear Reactors. (3-0). Credit 3. S**

Applies fundamentals of nuclear physics and reactor theory with engineering fundamentals to design of nuclear reactors. Prerequisite: N.E. 602 or registration therein.

**612. Radiological Safety and Hazards Evaluation. (3-0). Credit 3. II**

State and Federal regulations concerning radioactive materials. Radiation safety as applied to accelerators, nuclear reactors and radioactive byproducts. Rigorous methods of analysis applied to computation of biological radiation dose and dose rates from various sources and geometries. Radiation effects on physical systems. Prerequisites: Math. 601; N.E. 409; or approval of instructor.

**615. Nuclear Radiation Detection. (3-0). Credit 3. I**

Interaction of radiation with matter and behavior of ion pairs in presence of electric fields. Theory of operation for radiation detection devices. Prerequisite: Math. 307.

**618. Nuclear Control Systems. (3-0). Credit 3. II**

Fundamentals of servocontrol developed and applied to nuclear reactor. Safety aspects of reactor control and operational problems. Prerequisite: N.E. 602 or registration therein.

**621. Nuclear Metallurgy. (3-0). Credit 3. II**

Physical and metallurgical properties of metals used in nuclear reactors and reasons for their use. Prerequisite: M.E. 409.

**622. Nuclear Power Plant Design and Analysis. (3-0). Credit 3. II**

Designed to present application of nuclear reactor systems to field of power production, utilizing general fields of thermodynamics and heat transfer, along with special problems arising from nuclear system. Prerequisites: M.E. 323 or 328; N.E. 601.

**623. Analytical Nuclear Engineering I. (3-0). Credit 3. I**

Unified treatment of mass, momentum, and energy transport with applications to nuclear engineering sources. Velocity and temperature distributions in laminar and turbulent flow. Liquid metal heat transfer. Flow and thermal stability. Prerequisites: Math. 622 or 625; N.E. 610.



**624. Analytical Nuclear Engineering II. (3-0). Credit 3. II**

Unified analytical treatment of heat conduction in solids and thermal stress phenomena with application to nuclear energy sources. Transient heat conduction in solids. Isothermal elasticity. Thermoelasticity. Viscoelasticity. Plasticity. Prerequisites: Math. 622 or 625; N.E. 610.

**625. Nuclear Reactor Theory. (4-0). Credit 4. I**

Advanced treatment of neutron transport theory. Methods of solution of integro-differential and integral Boltzmann equations and their adjoints. Multigroup diffusion and transport theory. Prerequisites: Math. 602 or 617; N.E. 602.

**626. Nuclear Reactor Theory. (4-0). Credit 4. II**

Continuation of N.E. 625. Variational principles for discrete and continuous eigenvalues. Milne problem and Wiener-Hopf technique. Serber-Wilson and Feynman methods. Spatially independent and dependent slowing-down theory. Prerequisite: N.E. 625.

**629. Numerical Methods in Reactor Analysis. (3-0). Credit 3. S**

Solution of variable dimensions multi-group  $P_n$  calculations. In addition, Monte Carlo techniques, reactor kinetics, fuel cycle and reactor life study approximations will be presented. Prerequisite: Doctorate candidates.

**681. Seminar. (1-0). Credit 1. I, II**

Special topics in nuclear engineering not covered by formal course work. Whenever possible, guest lecturers will discuss topics which they have personally investigated. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 4 each semester. I, II**

Offered to enable students to undertake and complete limited investigations not within their thesis research and not covered by any other courses in curriculum. Prerequisite: Graduate classification.

**691. Research. Credit 1 or more each semester. I, II, S**

Research toward thesis or dissertation.

## Department of Oceanography

Professors Clayton, Leipper, Pequegnat (Acting Head), Reid; Associate Professors Cochrane, Ray; Assistant Professors Bryant, El-Sayed, Ibert, Nowlin

**201. Sea and Air Sciences. (1-0). Credit 1. I, II, S**

Oceanography and meteorology as scientific career fields. Features of natural environment which affect man's daily life and activities. Survey course open to all college students.

**401. Introduction to Oceanography. (3-0). Credit 3. I, II, S**

Subject matter survey. Discussion of interdisciplinary relationships between biological, chemical, geological, physical, meteorological, and engineering aspects of field. Typical studies. Prerequisite: Approval of instructor.

**403. Tides, Waves, Currents, Ice. (3-0). Credit 3. II**

Elements of physical oceanography pertaining to marine transportation and navigation. Astronomical and meteorological tides, wind waves and swell, major ocean current systems, sea ice. Prerequisite: Approval of instructor.

## FOR GRADUATES

**601. Research Methods in Oceanography. (1-0). Credit 1. I, II, S**

Selection of research problem for thesis work; planning program of investigation. Prerequisite: General prerequisites for oceanography.

**603. Sea Laboratory Techniques. (0-6). Credit 2. I**

Practice in techniques used regularly aboard ship and in collecting field data; cruise planning and execution; processing and analysis of data. Prerequisite: Approval of instructor.

**610. Physical Oceanography. (3-0). Credit 3. I**

Physics of sea: physical properties; light and sound transmission; heat and water budgets; distribution of temperature and salinity; hydrostatics; oceanic motions; turbulent transfer; water masses. Prerequisite: General prerequisites for oceanography.

**611. Theoretical Physical Oceanography. (3-0). Credit 3. II**

Kinematics and dynamics of fluids; Eulerian and Lagrangian description; thermodynamic considerations of single and multicomponent fluid mixtures; thermal stability; steady circulation. Prerequisites: Math. 601; Ocn. 610 or approval of instructor.

**612. Theory of Ocean Waves. (3-0). Credit 3. II**

Theories of simple harmonic surface waves, capillary waves, and internal waves; wave energy, wave spectra, propagation, modification in shallow water and superposition. Prerequisites: Math. 601; Ocn. 610; or approval of instructor.

**613. Engineering Aspects of Oceanography. (3-0). Credit 3. I**

Engineering applications of ocean wave theories, including long waves; wave spectra; wave generation and practical wave prediction; wave modification; wave forces. Prerequisites: Math. 308; Ocn. 612, or approval of instructor.

**614. Dynamics of the Ocean and Atmosphere. (3-0). Credit 3. I**

Unified linear perturbation theory of rotating stratified fluid with application to ocean and atmosphere; energy considerations; characteristic modes of motion; approximate methods of analysis. Prerequisites: Math. 602; Ocn. 611.

**620. Biological Oceanography. (3-0). Credit 3. II**

Critical analysis of contribution of biological science to our understanding of sea. Discernable interrelationships between organisms and physico-chemical parameters emphasized. Prerequisite: General prerequisites for oceanography.

**621. Biological Oceanography of the Gulf of Mexico. (1-6). Credit 3. I**

Detailed examination of selected aspects of biological oceanography of major importance to Gulf of Mexico. Prerequisite: Undergraduate major in biology or approval of instructor.

**630. Geological Oceanography. (3-0). Credit 3. I**

Survey of marine geology; structure and composition of ocean basins and continental margins; chemical and physical properties of marine sediments. Prerequisite: General prerequisites for oceanography.

**631. Geological Oceanography of the Gulf of Mexico. (3-0). Credit 3. II**

Theory of sediment transport; marine shorelines and processes operating in coastal zones; beach processes; nature of marine sediments. Prerequisite: Undergraduate major in geology or approval of instructor.

**640. Chemical Oceanography. (3-0). Credit 3. II**

Chemical composition and properties of sea water; evaluation of salinity; pH, excess base, and carbon dioxide system in sea; marine nutrients; oxygen and other dissolved gases; organic constituents. Prerequisite: General prerequisites for oceanography.

**641. Chemical Oceanography. (3-0). Credit 3. I**

Selected topics in chemical oceanography including: industrial utilization of sea water; chemical products of marine biota; water freshening; corrosion; photosynthesis and fertility of sea. Prerequisite: Undergraduate major in chemistry or approval of instructor.

**642. Laboratory Techniques in Oceanography. (0-6). Credit 2. I**

Analytical methods for biological, chemical, and geological investigations. Methods concern salinity, alkalinity, nutrients, organic production, photosynthesis, sediment particle size, trace elements. Prerequisites: Ocn. 610, 620, 630, 640 or approval of instructor.

**643. Geochemistry of the Ocean. (3-0). Credit 3. I**

Study of chemistry of elements in lithosphere, atmosphere and hydrosphere with emphasis on marine environment. Prerequisite: Undergraduate major in geology or approval of instructor.

**644. Isotope Geochemistry. (3-0). Credit 3. II**

Study of isotope geochemistry of different elements in nature. Evaluation of various age dating techniques. Prerequisite: Undergraduate major in geology or approval of instructor.

**651. Meteorological Oceanography. (1-3). Credit 2. I**

Large scale ocean-atmosphere interaction. Ocean emphasis. Interaction in relation to fog-hurricanes, water and air mass modification, and elements of circulations of air and water. Prerequisite: Met. 445 or Ocn. 610.

**652. Ocean Boundary Layer Problems. (3-0). Credit 3. I**

Theory of turbulent transfer of momentum, heat and moisture; mechanics of turbulence; dispersion; methods of analysis of stochastic time sequences. Prerequisites: Math. 414 or equivalent; Ocn. 611.

**681. Seminar. (2-0). Credit 2. I**

Presented by students and based upon their research work and upon surveys of literature.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Special topics to suit small group requirements. Deals with problems not within thesis research and not covered by any other course in established curriculum. Prerequisite: General prerequisites for oceanography.

**691. Research. Credit 1 or more each semester. I, II, S**

For thesis or dissertation. Topic subject to approval of Department Head.

## Department of Petroleum Engineering

Professors Calhoun, Crawford, Kennedy, Ramey, Whiting (Head); Associate Professor Pedigo; Assistant Professor McGuire; Instructor Penberthy

**300. Petroleum Engineering Field Problems. (1-6). Credit 3. S**

Field study of problems encountered in oil and gas fields. Consists primarily of visits to oil and gas fields. Requirements of course will not permit student to take any other course at same time. Prerequisite: Completion of junior petroleum engineering courses.

NOTE: This course may be taken in place of field work as required of all graduates in petroleum engineering. Field work or this course required before registration in any of the senior or fifth year petroleum engineering courses.

**305. Petroleum Development. (2-0). Credit 2. I**

Principles of oil field development, rotary and cable tool drilling, methods, drilling fluids, oil field hydrology. Prerequisites: Geol. 201, 207; Math. 307; Phys. 219.

**306. Reservoir Rock Properties. (2-0). Credit 2. II**

Systematic study of physical properties of petroleum reservoir rocks with particular emphasis on porosity, permeability, relative permeability, capillary characteristics, homogeneous and heterogeneous rock systems. Prerequisite: Pet.E. 307.

**307. Petroleum Development Laboratory. (0-3). Credit 1. I**

Properties of petroleum; operation of rotary drilling rig; well surveying practices; tests on drilling fluids and cements. Prerequisite: Pet.E. 305 or registration therein.

**308. Rock and Fluid Properties Laboratory. (0-3). Credit 1. II**

Core analysis, capillary pressure and relative permeability tests, fluid displacement tests; differential and flash vaporization tests of gas saturated crude oil at elevated pressure and temperature. Prerequisites: Pet.E. 306, 310, or registration therein.

**310. Reservoir Fluids. (3-0). Credit 3. II**

Thermodynamic behavior of naturally occurring hydrocarbon mixtures. Evaluation and correlation of physical properties of petroleum reservoir fluids, laboratory and empirical methods. Prerequisites: Chem. 323; Pet.E. 307.



**312. Well Logging. (1-0). Credit 1. II**

Preliminary study of logging methods with particular attention to electric logging and radioactive logging as they would be applied in petroleum industry. Prerequisite: Geol. 210.

**402. Petroleum Property Management. (3-0). Credit 3. II**

Factors which influence value of oil and gas properties; preparation of valuation reports, cost data, operating organization, regulation of petroleum production. Prerequisites: Pet.E. 409, 413, 428.

**405. Drilling and Production Design. (2-2). Credit 3. I**

Study and selection of drilling and production equipment used in oil field practice. Design of drilling and production systems. Prerequisites: C.E. 305; Pet.E. 305, 308, 312.

**409. Subsurface Engineering. (1-3). Credit 2. I**

Well logging, contour maps, isopachous maps, and determination of size, shape, and volume content of petroleum reservoirs. Prerequisites: Pet.E. 305, 308, 312.

**413. Petroleum Measurement and Transportation. (2-2). Credit 3. I**

Theory and methods of gas and liquid measurements and transportation including mixed streams, horizontal and vertical flow, etc. Prerequisites: M.E. 346; Pet.E. 310.

**414. Petroleum Production Engineering. (2-0). Credit 2. II**

Gas lift, surface separation and treatment of oil field fluids. Measurement, sampling and testing of crude oil, tank strapping and preparation of tank tables, oil storage, prevention of loss by evaporation, fire and lightning protection. Prerequisites: Pet.E. 405, 413.

**415. Measurements Laboratory. (0-3). Credit 1. I**

Methods of metering petroleum and natural gas. Study of flow of liquid gas and mixtures of gas and liquid. Advanced study of properties of petroleum at elevated pressure and temperature. Prerequisite: Pet.E. 413 or registration therein.

**416. Oil Measurements and Transportation Laboratory. (0-3). Credit 1. II**

Gauging practices, treating of oil-water emulsion, heat and sulphur content of petroleum and its products, determination of viscosity, gravity, water content, carbon residue, and coefficient of expansion of petroleum. Determination of vapor pressure of natural gasoline. Distillation of crude oil and gasoline. Methods of metering petroleum. Water analysis. Prerequisite: Pet.E. 414 or registration therein.

**419. Drilling Fluids. (0-3). Credit 1. II**

Laboratory course in which field technique and control of mud fluids to facilitate drilling are taught. Prerequisites: Senior classification in petroleum engineering; approval of Department Head.

**428. Reservoir Engineering. (2-0). Credit 2. I**

Material balance methods, including identification of type of reservoir mechanism, future production under primary recovery and gas injection; water influx calculations. Prerequisite: Pet.E. 308.

**429. Reservoir Mechanics Laboratory. (0-3). Credit 1. I**

Laboratory course to supplement theory of Pet.E. 428. Advanced core analysis; fundamental tests of PVT properties of petroleum at reservoir conditions. Prerequisites: Pet.E. 305, 308.

**438. Reservoir Engineering. (2-0). Credit 2. II**

Continuation of Pet.E. 428. Displacement of oil by extraneous fluids, evaluation of performance of combination drive reservoirs, sweep efficiency. Prerequisite: Pet.E. 428.

**481. Petroleum Engineering Seminar. (0-2). Credit 1. I**

Study and presentation of papers pertaining to recent developments in field of petroleum engineering. Prerequisites: Pet.E. 305, 308, 312.

**482. Petroleum Engineering Seminar. (0-2). Credit 1. II**

Study and presentation of papers pertaining to recent developments in field of petroleum engineering. Prerequisites: Pet.E. 305, 308, 312.

**485. Problems. Credit 1 to 5. I, II, S**

Special problems in various phases of petroleum engineering assigned to individual students or to groups. Prerequisites: Senior classification; approval of Department Head.

**FOR GRADUATES****601, 602. Drilling and Completing Wells. (3-3). Credit 4 each semester. S**

Advanced study of problems encountered in drilling and completing of oil and gas wells. Prerequisite: Approval of Department Head.

**603, 604. Advanced Reservoir Engineering. (3-3). Credit 4 each semester. I, II**

Advanced course in petroleum production practices with special reference to fundamental principles of flow of reservoir fluids. Prerequisite: Approval of Department Head.

**605. Phase Behavior of Petroleum Reservoir Fluids. Credit 2 to 4 each semester. 1**

Study of pressure, volume, temperature, composition relationships of petroleum reservoir fluids. Prerequisite: Approval of Department Head.

**607. Recovery Methods. Credit 2 to 4 each semester. II**

Study of methods of increasing recovery of petroleum from petroleum reservoirs. Prerequisite: Approval of Department Head.

**608. Well Logging Methods. (2-3). Credit 3. II**

Advanced study of well logging methods for determining nature and fluid content of formations penetrated by drill. Prerequisite: Approval of Department Head.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Study and presentation of papers on recent developments in reservoir mechanics. Prerequisite: Approval of Department Head.

**685. Problems. Credit 1 to 4 each semester. I, II**

Offered to enable students to undertake and complete limited investigations not within their thesis research and not covered by any other courses in curriculum. Prerequisite: Graduate classification.

**691. Research. Credit 1 or more each semester. I, II**

Advanced work on some special problem within field of petroleum engineering. Thesis course. Prerequisite: Approval of Department Head.

**Department of Philosophy and Humanities**

Assistant Professors Boone, Orr (Acting Head)

**HUMANITIES****105. Honors Colloquium for Freshmen. (1-0). Credit 1. I**

Survey of natural sciences. Lectures, discussions, and reports on individual readings. Prerequisite: Enrollment in Honors Program.

**106. Honors Colloquium for Freshmen. (1-0). Credit 1. II**

Survey of social sciences and humanities. Lectures, discussions, and reports on individual reading. Prerequisite: Enrollment in the Honors Program.

**201. Survey of Music Literature. (1-2). Credit 2. I, II, S**

Study of various types and styles of music literature. Lectures supplemented by listening. Music illustrations selected primarily from standard concert repertoire. For the music listener with little or no formal training in music.

**311. Use of Library Resources. (0-2). Credit 1. I, II**

Designed to develop in students skill in use of library resources at upper level. Emphasis placed on specialized reference tools. Prerequisites: Completion of sophomore English; junior classification.

## PHILOSOPHY

**301. Introduction to Philosophy. (3-0). Credit 3. I, II**

Introduction to philosophical vocabulary and inquiry, based on study of major issues.

**331. Introduction to the Philosophy of Religion. (2-0). Credit 2. I**

Philosophical investigation of religious experience, thought, and language.

**381. Ethical Theory. (3-0). Credit 3. II**

Systematic and critical consideration of representative answers to problems concerning values.

**406. Ancient and Medieval Philosophy. (3-0). Credit 3. I**

Study of philosophers and philosophical movements of ancient and medieval periods.

**407. Modern Philosophy. (3-0). Credit 3. II**

Study of philosophers and philosophical movements from Renaissance to twentieth century.

## FOR GRADUATES

**601. Major Philosophical Issues. (2-0). Credit 2. II**

Designed to introduce graduate students to major issues of philosophical thought.

## Department of Physics

Professors Coon, Eisner, Gammel, Ham, McIntyre, Potter (Head), Squire, Weekes; Associate Professors Barker, Boriskie, Duller, Northcliffe, Nuttall; Assistant Professors Kenefick, Kubis, Loyd, McDonald, Saylor, Sittler; Instructors Barnes, Boehme, Cantrell, Franks, Petty, Phillips, Reyna, Smith, Stewart, Tapley, Wiff

**201. College Physics. (3-3). Credit 4. I, II, S**

Fundamentals of classical mechanics, heat, and sound primarily for architecture, education, premedical, pre dental, and pre-veterinary medical students. Prerequisite: Math. 103.

**202. College Physics. (3-3). Credit 4. I, II, S**

Continuation of Phys. 201. Fundamentals of classical electricity and light and introduction to contemporary physics. Prerequisite: Phys. 201.

**211. A Brief Survey of Physics. (3-3). Credit 4. II**

Designed to acquaint students with field of knowledge and contemporary activity of importance in modern thinking. Prerequisite: Math. 102.

**213. Physics for Students of Agriculture. (2-2). Credit 3. I, II**

Brief course emphasizing fundamentals of mechanics, heat, light, and electricity of special importance to students of agriculture. Prerequisite: Math. 102.

**218. Mechanics and Heat. (3-3). Credit 4. I, II, S**

Mechanics and heat for students of engineering and physical sciences. Prerequisite: Math. 121 or 209 or registration therein.

**219. Sound, Light, Electricity. (3-3). Credit 4. I, II, S**

Continuation of Phys. 218. Sound, light, electricity. Prerequisites: Math. 122 or 210 or registration therein; Phys. 218.

**220. Modern Physics. (3-3). Credit 4. I, II, S**

Continuation of Phys. 219. Atomic, nuclear, and solid-state physics. Prerequisites: Math. 122 or 210; Phys. 219.

**302. Physical Mechanics. (3-0). Credit 3. I**

Motion of particle in various force fields; systems of particles. Prerequisites: Math. 308 and registration in 405; Phys. 220.



**310. Applications of Modern Physics. (2-2). Credit 3. II, S**

Non-technical survey of atomic and nuclear phenomena of interest to students of geology, biochemistry, genetics, biology, education, and especially premedical and pre-dental students. Prerequisites: Chem. 101 or 103; Phys. 202 or 219.

**311. Quantum Physics. (3-0). Credit 3. I, S**

Atomic and nuclear phenomena that have led to establishment of modern physics; introduction to special relativity and quantum relationships. Prerequisites: Math. 308; Phys. 220.

**314. Survey of Astronomy. (3-0). Credit 3. I, II, S**

Solar system; meteors; asteroids; comets; stars; clusters, nebulae; Kepler's laws; laws of gravitation; astronomical instruments. Occasional evening meetings for observation. Prerequisites: Math. 102, 103.

**317. Celestial Mechanics. (4-0). Credit 4. I**

Mathematical formulation of celestial mechanics, central forces, potentials and attractions of bodies; the two-, three-, and  $n$ -body problems. Prerequisites: Math. 307; Phys. 201 or 218.

**322. Intermediate College Physics. (4-6). Credit 6. I, S**

Review of physics for high school and junior high science teachers and elementary science supervisors to better prepare them for upper division courses. Prerequisite: Six hours of physics.

**323. Topics in Electricity and Electronics. (2-3). Credit 3. S**

Topics that high school and junior high science teachers and elementary science supervisors will be able to pursue in instruction in their schools. Prerequisites: Math. 122 or 210; Phys. 202, 219, or 322.

**325. Physics Laboratory. (0-3). Credit 1. I**

Experimental studies primarily in physical optics. Prerequisite: Registration in Phys. 311.

**326. Physics Laboratory. (0-3). Credit 1. II, S**

Experimental studies primarily in electricity, magnetism, and electronics. Prerequisite: Registration in Phys. 413.

**327. History and Philosophy of Physical Science. (3-0). Credit 3. I**

From Babylon to Atomic Age; development of scientific philosophy into modern pragmatic view; designed to give student feeling for scientific method and environment of scientist. Prerequisite: Phys. 220.

**405. Physical Mechanics. (3-0). Credit 3. II**

Continuation of Phys. 302. Rigid bodies; moving coordinate systems; continuous media; generalized coordinates. Prerequisites: Math. 405; Phys. 302 or equivalent.

**408. Thermodynamics and Statistical Mechanics. (3-0). Credit 3. II, S**

Applications to mechanical and chemical systems and to theory of blackbody radiation; kinetic theory of gases. Prerequisites: Math. 307; Phys. 220.

**412. Introduction to Quantum Mechanics. (3-0). Credit 3. I, S**

Postulates of wave mechanics; wave packets; harmonic oscillator; central field problem; selection rules; electron spin; exclusion principle. Prerequisite: Phys. 311.

**413. Electricity and Magnetism. (3-0). Credit 3. II, S**

DC and AC circuit theory; introduction to electronic circuits. Prerequisites: Math. 308; Phys. 219.

**414. Electricity and Magnetism. (2-3). Credit 3. I**

Non-linear circuits; functions of tubes and transistors; electronic circuits and circuit elements for physical measurements. Prerequisite: Phys. 413 or approval of instructor.

**416. Electromagnetic Fields. (3-0). Credit 3. I**

Vector analysis applied to electromagnetic field theory; dielectrics and magnetic materials; Maxwell's equations; radiation. Prerequisites: Math. 405 or 601; Phys. 413 or approval of instructor.

**417. Radiation and Optics. (3-0). Credit 3. II**

Lorentz theory of radiation; dipole radiation; radiation from a Lorentz atom; Kirchhoff integral applied to diffraction; reflection; refraction; scattering. Prerequisite: Phys. 416.

**420. Introduction to Astrophysics. (4-0). Credit 4. II**

Sun's core; internal structure of stars; stellar and planetary atmospheres; radiation; interstellar matter. Prerequisites: Math. 307 or registration therein; Phys. 220, 314, and a course in heat.

**421. Celestial Mechanics. (4-0). Credit 4. II**

Continuation of Phys. 317. Binary star systems; orbits; perturbations of the moon; general perturbations; problem of satellites. Prerequisite: Phys. 317.

**424. Physics of Solids. (3-0). Credit 3. II**

Modern theories of crystalline structure, specific heats, dielectric properties, conduction, semiconduction, electron emission, magnetism. Prerequisite: Phys. 311.

**425. Physics Laboratory. (0-3). Credit 1. I**

Experiments in nuclear, atomic, and molecular physics using modern instrumentation and equipment of current research. Prerequisite: Senior classification in physical sciences or engineering.

**426. Physics Laboratory. (0-3). Credit 1. II**

Experiments in solid state and nuclear physics. Modern instrumentation and current research equipment are employed. Prerequisite: Senior classification in physical sciences or engineering.

**427. Electrical and Electronic Circuits. (2-3). Credit 3. S**

DC and AC circuit theory; electrical measurements; introduction to electronics. Prerequisites: Math. 308; Phys. 219.

**428. Nuclear Physics. (3-0). Credit 3. II**

Passage of radiations through matter; detection methods; accelerators; systematics of nuclei. Prerequisite: Phys. 311.

**430. Introduction to Biophysics. (3-0). Credit 3. I**

Application of physics to study of living systems; nervous and sensory systems; enzyme kinetics; biological thermodynamics; active transport processes; modern instrumentation. Prerequisite: Phys. 202 or 219.

**435. Classical and Quantum Wave Mechanics. (3-0). Credit 3. II**

Pressure waves; electromagnetic wave propagation in transmission lines; wave propagation in periodic structures; electron transport in metals. Prerequisite: Math. 308.

**485. Problems. Credit 1 to 4. I, II, S**

Special work in laboratory or theory to meet individual requirements in cases not covered by regular curriculum. Prerequisite: Approval of Department Head.

**FOR GRADUATES****600. Physics for Secondary School Teachers. (2-3). Credit 3. S**

Fundamentals of classical and modern physics that should be taught in high school; methods of preparing and conducting demonstrations and laboratories. Prerequisites: Graduate classification; approval of Department Head.

**601. Analytical Mechanics. (4-0). Credit 4. II**

Dynamics of particles and rigid bodies; hydrodynamics; Hamilton's principle; principle of least action; LaGrange's and Hamilton-Jacobi equations. Prerequisites: Math. 405 or 601; Phys. 405.

**603. Electromagnetic Theory. (4-0). Credit 4. I, S**

Static and time-varying fields; propagation, reflection and refraction of electromagnetic waves. Prerequisites: Math 601; Phys. 416; or equivalents.

**606. Quantum Mechanics. (4-0). Credit 4. II**

Postulational development. Hamiltonian formalism; canonical transformations; representation and expansion theory; perturbation theory. Prerequisite: Phys. 412.

**607. Statistical Mechanics. (4-0). Credit 4. I, S**

Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac distributions; ensemble theory; statistical thermodynamics; electrons in metals; lattice specific heats. Prerequisite: Phys. 408 or approval of instructor.

**611. Electromagnetic Theory. (4-0). Credit 4. II**

Continuation of Phys. 603. Boundary value problems of vector wave equation; effect of matter on waves; anisotropic dielectrics; dispersive media. Prerequisite: Phys. 603.

**612. Introductory Quantum Mechanics. (3-0). Credit 3. S**

Schrodinger wave equation; uncertainty principle; one-dimensional problems; hydrogen atom; angular momentum; transition probabilities. Prerequisite: Phys. 311.

**617. Physics of the Solid State. (3-0). Credit 3. II**

Crystalline structure, lattice vibrations; dielectric phenomena; luminescence, magnetism; free electron and band theories; semi-conductors. Prerequisites: Phys. 412, 607.

**624. Quantum Mechanics. (4-0). Credit 4. I, S**

Continuation of Phys. 606. Scattering theory; angular momentum theory; matrix mechanics; application to atomic and nuclear systems; semi-classical radiation theory. Prerequisite: Phys. 606.

**625. Nuclear Physics. (3-0). Credit 3. I, S**

The two-nucleon problem; electromagnetic interactions; beta decay; nuclear reactions; subnuclear particle reactions. Prerequisites: Phys. 428, 606 or equivalent.

**631. Quantum Theory of Solids. (3-0). Credit 3. I**

Perfect and imperfect crystal lattices; interaction of electromagnetic radiation with non-conducting crystals; metallic cohesion; transport phenomena; semiconductors. Prerequisite: Phys. 617.

**632. Molecular Structure. (4-0). Credit 4. II**

Principle of group theory; molecular orbitals; molecular vibrations; the rigid rotator; ultraviolet spectra; infrared and Raman spectra. Prerequisite: Approval of instructor.

**634. Relativistic Quantum Field Theory. (3-0). Credit 3. I**

Perturbation theory and renormalization techniques; dispersion relations, Mandelstam representation. Prerequisite: Phys. 606.

**635. Scattering Theory. (3-0). Credit 3. I**

Scattering of particles by non-central fields; polarized particles; scattering of pions and nucleons by nucleons; the optical model; the deuteron stripping reaction. Prerequisites: Phys. 606. (Offered in 1965-66 and in alternate years thereafter.)

**636. The Many-Body Problem. (3-0). Credit 3. II**

Nuclear matter, liquid He<sup>3</sup>, the Bose gas, the electron gas, superconductivity. Prerequisite: Phys. 606. (Offered in 1965-66 and in alternate years thereafter.)

**637. Relativity. (3-0). Credit 3. S**

Special relativity, co-variant formulation of mechanics and electrodynamics; general relativity, tensor calculus and non-Euclidean geometry; cosmological problems and unified field theories. Prerequisites: Phys. 601, 603. (Offered in 1965-66 and in alternate years thereafter.)

**638. Physics of Plasmas. (3-0). Credit 3. II**

Many-body kinetic theory of plasmas; plasma fluctuations; propagation of electromagnetic waves through plasmas; magnetohydrodynamics; plasma stability and confinement. Prerequisites: Phys. 603, 607, 624. (Offered in 1965-66 and in alternate years thereafter.)

**639. Magnetic Resonance. (3-0). Credit 3. I**

High resolution spectra; relaxation phenomena; electron resonance; electron-nucleus interaction; resonance in solids and liquids; effects of strong radio-frequency fields. Prerequisites: Phys. 603, 607, 624.



**644. Low Temperature Physics. (3-0). Credit 3. I**

Quantum behavior of matter at extremely low temperatures; superfluid liquid helium; superconductivity; thermal properties of solids; electric and magnetic phenomena. Prerequisites: Phys. 606, 607.

**645. Nuclear Theory. (3-0). Credit 3. II**

Topics of current interest, e.g., multipole theory of electromagnetic interaction, shell model, and collective model of nucleus. Prerequisites: Phys. 606, 625.

**648. Cosmic Rays. (3-0). Credit 3. II**

Phenomenology and theory of contemporary cosmic ray physics with emphasis on subjects of current research interest. Prerequisites: Phys. 603, 606; approval of instructor.

**654. Low Temperature Physics. (3-0). Credit 3. II**

Continuation of Phys. 644. Topics from current literature involving latest theories and experiments on superfluids, thermal properties of solids, and electromagnetic effects on matter at very low temperatures. Prerequisite: Phys. 644.

**681. Seminar. (1-0). Credit 1. I, II, S**

Examination of subjects of current importance. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Individual problems not related to thesis.

**691. Research. Credit 1 or more each semester. I, II, S**

Research toward thesis or dissertation.

## Department of Plant Sciences

Professors Hall, Joham, Langston, Rosberg (Head), Watkins; Associate Professors Applegate, McNeil, Powell, Smith, Thames; Assistant Professors Amin, Frederiksen, Halliwell, Katterman, Miller, Morgan; Lecturer Hacskaylo; Plant Pathologists Hobbs, Kilpatrick, Schroeder; Plant Physiologists Ergle, Meyer, Morton; Silviculturist van Buijtenen

### GENETICS SECTION

**301. Genetics. (3-2). Credit 4. I, II, S**

Fundamental principles of genetics: variation, heredity, physical basis of Mendelian inheritance, expression and interaction of genes, linkage, sex linkage, and mutation. Prerequisite: Biol. 101 or 107.

(See Agro. 304, An.Sc. 306, P.S. 414, and Stat. 406 for descriptions of related courses.)

### FOR GRADUATES

**603. Genetics. (3-0). Credit 3. I**

Development of fundamental concepts including dominance, chromosome theory of heredity and linkage, sexuality, mutation and position effect, gene concept and extra nuclear inheritance. Prerequisite: Gen. 301.

**604. Genetics Laboratory. (0-3). Credit 1. I**

Inheritance studies principally with *Drosophila* including laboratory techniques and methods. Arranged to complement Gen. 603 and required for genetics majors.

**612. Plant Genetics. (3-3). Credit 4. II**

Specialized study of genetics as related to plant breeding. Emphasis placed on quantitative inheritance, heterosis, selection, ploidy, reproductive systems and processing of quantitative data. Prerequisites: Gen. 603; Stat. 406.

**620. Cytogenetics. (3-3). Credit 4. II**

Study of correlated genetical and cytological phenomena. Prerequisites: Biol. 615; Gen. 603.

**623. Special Topics in Genetics. Credit 1 to 3. I**

Content will depend upon interest of students and specialty of instructor. Lecturers who have attained distinction in genetics or related fields will conduct course.

**624. Statistical Genetics. (2-0). Credit 2. I**

Probability as applied to genetic systems; derivation of genetic expectations; theory of inbreeding; estimation and testing of genetics parameters; statistical aspects of quantitative inheritance. Prerequisites: Gen. 603; Stat. 406.

**625. Speciation. (2-0). Credit 2. I**

Study of genetic and environmental forces which operate in species formation together with critical examination and comparison of more important current explanations of speciation. Prerequisite: Gen. 301. (Offered in 1966-67 and in alternate years thereafter.)

**631. Biochemical Genetics. (2-0). Credit 2. I**

Study of genetic control of cellular metabolism; mechanism of gene action; genetic capacity for biosynthesis; gene-enzyme relationships; pleiotropism; chemical nature of agents of heredity. Prerequisites: B.N. 410 or Chem. 227; Gen. 301.

**633. Forest Genetics. (2-0). Credit 2. I**

Specialized study of genetics as applied to forest trees; forest tree improvement and forest tree breeding, with emphasis on genetics of conifers, especially pines. Prerequisite: Gen. 603. (Offered in 1965-66 and in alternate years thereafter.)

**634. Forest Genetics Laboratory. (0-3). Credit 1. II**

Methods and techniques in forest genetics, forest tree breeding; crossing, grafting, air layering, field layouts, seed handling, greenhouse techniques. Prerequisite: Gen. 633. (Offered in 1966-67 and in alternate years thereafter.)

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Technical research problems subject to approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Prerequisite: Gen. 603.

(See An.Sc. 616, 628; P.S. 613; Stat. 605 for descriptions of related courses.)

**PLANT PHYSIOLOGY AND PATHOLOGY SECTION****301. Plant Pathology. (2-3). Credit 3. I**

Introduction to fundamental principles of plant pathology, including diagnosis, cause, and control of plant diseases. Prerequisites: Biol. 101, 206.

**313. Introduction to Plant Physiology. (2-3). Credit 3. I**

General course dealing with principal life processes of higher plants, with particular emphasis on influence of environmental factors on these processes. Prerequisites: Biol. 101; Chem. 102 or 104.

**314. Principles of Plant Physiology. (3-3). Credit 4. II**

More advanced and detailed study of physiology of green plants than P.P.P. 313, with emphasis on nitrogen metabolism, respiration, mineral nutrition, photosynthesis, and growth. Prerequisites: Chem. 231; Phys. 213; P.P.P. 313.

**FOR GRADUATES****605. Plant Metabolism. (3-0). Credit 3. I**

Metabolic pathways of major classes of plant compounds, respiration and photosynthesis as metabolic processes and bioenergetics. Prerequisite: P.P.P. 314. (Offered in 1965-66 and in alternate years thereafter.)

**607. Physiology of the Fungi. (3-0). Credit 3. II**

General course in physiological activities of fungi, including growth and development, mineral nutrition, carbon and vitamin nutrition, chemistry of metabolic products, fungicides, and physiology of parasitism and resistance. Prerequisite: P.P.P. 314. (Offered in 1965-66 and in alternate years thereafter.)

**609. Quantitative Plant Physiology. (2-6). Credit 4. II**

Methods employed in various types of physiological investigations and interpretation of results obtained by them. Prerequisite: P.P.P. 314.

**611. Plant Nutrition. (3-0). Credit 3. II**

Inorganic nutrition of plants, including solute absorption, accumulation and translocation; growth in artificial media; physiological roles of various elements and biochemical problems associated with salt absorption. Prerequisite: P.P.P. 314 or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**612. Phytohormones and Plant Growth Regulators. (3-0). Credit 3. I**

Classification, properties, and action of naturally occurring plant hormones as well as synthetic growth regulators and their practical application. Prerequisite: P.P.P. 314 or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**613. Plant Growth and Development. (3-0). Credit 3. I**

Course dealing with growth, differentiation, and development of higher plants. Comprehensive study of vernalization and photoperiodism as well as discussion of hormones and biological rhythms. Prerequisite: P.P.P. 314 or equivalent.

**616. Methods in Plant Pathology. (2-6). Credit 4. II**

Familiarization with standard techniques and equipment used in investigation of plant disease and various plant pathogens. Prerequisite: P.P.P. 301 or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**617. Parasitism in Plant Disease. (3-3). Credit 4. I**

Critical review of literature on parasitism and mechanisms of host defense. Processes studied by histological preparations and experimentation. Prerequisite: P.P.P. 301. (Offered in 1965-66 and in alternate years thereafter.)

**618. Bacterial Plant Diseases. (2-3). Credit 3. II**

Detailed study of bacterial diseases of fruit and vegetable crops, field crops and ornamental plants, with special emphasis upon nature of the disease, dissemination of the pathogen, and methods of control. Prerequisite: P.P.P. 301 or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**620. Plant Viruses. (2-0). Credit 2. II**

Study of nature and properties of plant viruses and plant virus diseases. Prerequisite: P.P.P. 301 or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**621. Plant Parasitic Nematodes. (2-3). Credit 3. I**

Morphology, identification, and biology of plant parasitic and soil-borne nematodes; damage they cause; methods of control. Prerequisite: Approval of instructor.

**622. Plant Nematology. (1-6). Credit 3. II**

Advanced study of principal groups of plant parasitic and soil-borne nematodes with emphasis on biology. Prerequisite: P.P.P. 621 or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**623. Diseases of Field Crops. (2-3). Credit 3. I**

Intensive study of both fundamental and practical aspects of more important and representative diseases of field crops. Plant disease problems peculiar to extensive cultivation methods will be stressed. Prerequisite: P.P.P. 301.

**624. Diseases of Fruits, Vegetables and Ornamentals. (2-3). Credit 3. II**

Identification and control of important diseases of fruit, vegetable, and ornamental crops in Texas. Various diseases and types of decay affecting products in shipment and storage. Prerequisite: P.P.P. 301. (Offered in 1965-66 and in alternate years thereafter.)

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Reports and discussions of topics of current interest in plant physiology and plant pathology, including reviews of literature on selected subjects.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Individual problems or research not pertaining to thesis or dissertation. Prerequisite: P.P.P. 314 or equivalent (for physiology), 301 or equivalent (for pathology).

**691. Research. Credit 1 or more each semester. I, II, S**

Original investigations in support of thesis or dissertation.



## Department of Poultry Science

Professors Couch, Ferguson, Krueger, Quisenberry (Head); Associate Professors Creger, Gardner, Ryan; Assistant Professors Atkinson, Bradley

### 201. Poultry Production. (2-2). Credit 3. I, II

Basic course in poultry science that involves principles and practices in production and marketing of poultry and poultry products in a highly specialized industry. Practice consists of application of basic skills required for efficient performance.

### 303. Turkey Production. (2-0). Credit 2. II

Varieties of turkeys; breeding practices; management and feeding; incubation practices; management of poults from hatching to market; special turkey marketing practices; sanitation and disease prevention with special reference to turkeys.

### 308. Hatchery Management. (2-3). Credit 3. II

Study of incubation, business and management fundamentals associated with independent franchise and integrated hatchery operations. Management techniques and problem solving are stressed. Research is presented to support principles proposed for sound hatchery management.

### 309. Broiler Production. (2-2). Credit 3. I

Comprehensive study of commercial broiler industry involving advanced elements of production, processing, and marketing. Practice consists of designing and conducting experiments and demonstrations for evaluation of meat strains, rations, and environmental factors.

### 401. Management and Selection. (1-2). Credit 2. II

Study in recognizing field problems in poultry science and how those working with vocational training programs can economically solve such problems. Practice consists of training skills such as judging, fitting show birds and management of a show, demonstrations, and science projects using poultry.

### 403. Judging. (2-2). Credit 3. I

Study of selection standards for meat and egg strains of poultry, grading standards for live and dressed poultry and market eggs, and organizing and managing a poultry show. Practice consists of intensive judging of production rings and poultry market products.

### 407. Technology and Marketing of Poultry and Poultry Products. (2-2). Credit 3. I

Study of U.S.D.A. grading of eggs and poultry; preparation of poultry for market; grading and packing shell eggs; factors affecting product quality; storage of poultry and egg products with emphasis on maintenance of quality; developments in packaging and merchandizing; U.S.D.A. grading and inspection.

### 411. Principles of Nutrition. (3-2). Credit 4. I

Study of chemical composition of carbohydrates, proteins, fats, vitamins, and mineral mixtures as found in poultry feeds and nutritive value of different grains, roughages, mill feeds, and protein concentrates. Prerequisites: Chem. 223, 231.

### 414. Poultry Breeding. (2-2). Credit 3. I

Basic principles of poultry breeding. Inheritance of qualitative and quantitative traits; evaluation of methods of breed selection, mating systems and of basic statistical analysis of breeder records. Prerequisite: Gen. 301.

### 481. Poultry Seminar. (1-0). Credit 1. II

Extensive review of the literature. Effective and efficient use of library. Procedures for organized informational follow-up on new developments after graduation. Scientific and popular journal organization and contents. Reports on current literature. Prerequisite: Senior classification.

### 485. Problems. Credit 1 to 4 each semester. I, II, S

Directed study of selected problems not covered by other courses in the Department. Content of course would be adapted to interest and needs of students. Prerequisite: Approval of Department Head.

FOR GRADUATES

**603. Principles and Practices of Incubation. (3-3). Credit 4. II**

Study of basic principles underlying successful artificial incubation of eggs. Relation of egg characters to hatchability. Developmental stages of chick during incubation. Prerequisite: P.S. 308 or equivalent.

**604. Principles of Brooding and Rearing. (3-3). Credit 4. I**

Intensive literature review and analysis of environmental and physiological factors influencing growth and development of domestic birds. Density, seasonal rhythms, social behavior, plane of nutrition, etc. are considered. Prerequisites: P.S. 201, 303 or equivalent.

**609. Avian Physiology. (3-3). Credit 4. I**

Study of basic physiological principles pertaining specifically to avian species. Chicken used as laboratory animal. Vascular, digestive, neural, respiratory, and reproductive systems will be stressed. Prerequisites: Biol. 433; approval of instructor.

**611. Poultry Processing, Storing, and Distribution. (3-0). Credit 3. II**

Studies of poultry and egg quality and of methods of maintaining product quality. Effects of storage condition and time on egg and meat quality. Production factors affecting product quality. Evaluation of commercial methods of product assembly, processing and distribution.

**612. Laboratory Problems in Poultry Processing, Storing, and Distribution. (0-3). Credit 1. II**

Survey of methods of processing poultry and eggs. Selected processing plants visited and study made of operating methods. Poultry and egg products analyzed using standard quality control methods. Effects of processing methods on market quality.

**613. Breeding and Genetics of Poultry. (3-3). Credit 4. II**

Advanced poultry breeding; emphasis on estimation of genetic parameters, measuring genetic improvement, effective population size, general and specific combining ability, fitness, diallel crossing, efficiency of breeding systems in poultry. Prerequisite: Approval of instructor.

**615. Avian Nutrition. (3-0). Credit 3. I**

To cover metabolism and nutritional requirements of domestic fowl to include proteins, carbohydrates, fats, minerals, vitamins and related feed additives. Prerequisites: Chem. 228; P.S. 411.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Intensive review of literature on feeding, breeding, incubation, marketing and management. Development of familiarity with journals, organizations, agencies and personnel working on poultry problems. May be repeated as many semesters as desired. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 6 each semester. I, II, S**

Intensive study of newer principles and methods in various specialized fields of poultry science — breeding, nutrition, market technology. Prerequisite: Approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Research methods and techniques in breeding, nutrition, physiology, marketing, management and products technology. Students must conduct experiments in one of these fields. Design of experiments, collection, analysis and presentation of experimental data. Designed for thesis or dissertation credit.

**Department of Range Science**

Professors Dyksterhuis, Gould, Leinweber (Head), Sperry; Associate Professors McCully, Rhodes; Assistant Professors Dodd, Huss; Lecturers Merrill, Waldrip

**FORESTRY SECTION**

**201. Dendrology. (3-3). Credit 4. II**

Identification, classification, nomenclature, distribution, values, and principal silvical characteristics of more common tree species of United States. Prerequisite: Biol. 102.

**302. Forest Ecology. (3-0). Credit 3. I**

Study of ecological structure of forests and factors which affect forest communities and ecological change. Prerequisite: R.S. 205.

**305. Silviculture. (3-0). Credit 3. II**

Principles of natural and artificial regeneration of forest stands as related to cultural operations and forest genetics. Prerequisite: For. 302.

**306. Forest Mensuration. (2-0). Credit 2. II**

Principles of determining volumes of logs and standing timber; making volume, growth, and stand tables; developing stand and yield tables. Prerequisite: Registration in For. 305.

**309. Silvics and Silviculture. (2-3). Credit 3. I**

Study of factors of site, their influence on tree growth and reciprocal effect on site; silvicultural cutting systems, cultural operations, and silvicultural characteristics of more important commercial species of South and Southwest. Field trips.

**335. Silvical Practice. (0-6). Credit 2. S**

Field practice in planning, execution, and evaluation of silvicultural methods and techniques. Prerequisites: For. 305, 306.

**336. Mensuration Practice. (0-6). Credit 2. S**

Field practice in land surveys, timber surveys, use of aerial photos, volume estimates, growth curves, stand tables, determining quality and local volume tables. Prerequisite: For. 306.

**402. Forest Products. (3-3). Credit 4. I**

Study of forest products other than lumber, their importance, manufacture, and uses. Prerequisite: Senior classification.

**403. Forest Valuation. (3-3). Credit 4. II**

Principles and techniques related to forest investments, valuation procedures, taxation, and insurance. Prerequisites: For. 305, 306.

**404. Forest Management. (2-6). Credit 4. II**

Detailed study of forest management systems integrating silviculture mensuration and economics, wood quality, and multiple use interrelationships. Prerequisites: For. 305, 306.

**RANGE SCIENCE SECTION****102. Introduction to Range and Forestry. (1-0). Credit 1. I, II**

Brief survey of fields of forestry and range management including history, resources, policies, organization, industries, employment, education and research pertaining to respective professions. One field trip into forest required.

**205. Plant Ecology. (2-2). Credit 3. I, II**

Introduction to plant ecology studying scope and organization of plants into systematic units influenced by environmental factors and mechanisms which allow plants to adapt to changes in environment. Prerequisite: Biol. 101.

**303. Agrostology. (2-2). Credit 3. I**

Fundamental study of grasses, especially those of economic importance in Texas. Structure of grasses, subfamily-tribe relationships, grass classification, important genera and species. Prerequisite: Biol. 102 or equivalent.

**314. Principles of Range Management. (2-2). Credit 3. I, II**

Technical course in range management for students interested in basic knowledge of range management. Principles of forage plant properties, poisonous plants, ecology and management of rangelands for sustained production. Field trips. Prerequisite: Junior or senior classification.

**315. Vegetation Evaluation Methods. (2-2). Credit 3. II**

Methods and techniques of vegetation analysis related to forest, range, and pasture lands; sampling procedures and instrumentation used for determining vegetation inventories, conditions, uses, and trend. Prerequisites: Biol. 101; approval of Department Head.



**316. Grassland Ecology. (2-2). Credit 3. II**

Principles of plant succession and ecological formations of North America emphasized. Treatment of grassland ecology from ecosystem approach. Prerequisites: Biol. 102; R.S. 205.

**415. Advanced Range Management. (3-2). Credit 4. II**

Advanced course dealing with basic concepts and theories of range management systems as related to physiological, edaphic and ecological principles. Special attention devoted to plant-animal-environmental interactions. More emphasis given to management planning. Prerequisites: R.S. 314, 315, or approval of Department Head.

**417. Synecology. (2-2). Credit 3. I**

Emphasis given to dynamic aspects of plant community development with particular study on concepts of ecological plant climax and identification of ecological position through observing specific indicator plants. Prerequisite: R.S. 316.

**418. Weed and Brush Control. (2-2). Credit 3. I**

Study of fundamentals of weed and brush control together with application to production of forage crops, livestock, and other agricultural commodities. Emphasis given to characteristics, selection, and application of alternative methods of controlling weeds and brush in management and conservation of agricultural lands. Prerequisite: Chem. 227 or approval of Department Head.

**419. Advanced Plant Ecology. (2-4). Credit 3. I**

Single environmental factors which determine ecological potentials such as soil, temperature, rainfall, relative humidity, evaporation, photoperiod, and others. Laboratories devoted to measurement and interpretation of single factor affects. Prerequisite: R.S. 205.

**481. Seminar. (1-0). Credit 1. I, II**

Selected topics discussed by senior students in fall semester. Staff members and invited speakers will discuss professional attitudes and opportunities in range management. Prerequisites: Senior classification; major in range science.

**485. Range Problems. Credit 1 to 3 each semester. I, II, S**

Individual study and research upon a selected range problem approved by instructor.

**FOR GRADUATES**

**605. Range Research Methods. (2-0). Credit 2. I**

Study of research methods in range management and related subjects. Review of scientific investigation in field and analysis of results. Prerequisite: Graduate majors and minors in range science.

**606. Range Economics. (2-0). Credit 2. II**

Range management practices, land utilization, and ranch operation as they affect economics of livestock industry and nation. Prerequisite: Graduate majors and minors in range science.

**607. Vegetation Influences. (3-0). Credit 3. I**

Interrelationships-between ecological factors and vegetation, influence of forest and range vegetation on watershed management and soil conservation. Prerequisite: R.S. 316 or equivalent.

**609. Plant and Range Ecology. (3-0). Credit 3. II**

Detailed study of plant communities, successions, and effect of various degrees of utilization in vegetation types and edaphic factors. Prerequisite: R.S. 316 or equivalent.

**610. Range Grasses and Grasslands. (2-3). Credit 3. II**

Study of basic concepts of grass structure and classification, recent advances in agrostological research, genetical and ecological basis for patterns of variation and evolution in grasses. Prerequisites: R.S. 303, 316; or approval of Department Head.

**611. Control of Noxious Range Plants. (3-0). Credit 3. I**

Advanced study of noxious and poisonous plants detrimental to good management of ranges in Texas and Southwest. Distribution, reproduction, dissemination, economic importance, and alternative methods for controlling these undesirable plants stressed. Field trips.

**612. Range Management Practices, Policies, and Administration. (3-0). Credit 3. I**

Advanced studies dealing with development of policy through political process, national to local philosophical values and social goals, administrative decision making, and technical objectives. Emphasis on current policy problems related to land resource use. Prerequisite: R.S. 415 or equivalent.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Current scientific work in range management and related subjects in American and foreign fields. Prerequisite: Majors and minors in range science.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Course designed for investigations not included in student's research for thesis or dissertation. Problems selected in applied ecology, range management, or forestry. Lectures, conferences, field work, reports. Prerequisite: Graduate majors or minors in range science.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis or dissertation. Prerequisite: Graduate majors in range science.

### **Department of Recreation and Parks**

**301. Principles of Wildland Recreation. (3-0). Credit 3. I**

Study of importance, history, location, and economics of wildland recreation activities. Study of national forests and parks as well as potential private recreation opportunities. Prerequisite: Major or minor in Recreation and Parks.

**302. Principles of Park Administration. (3-0). Credit 3. II**

Study of existing policies on national parks and forests with particular emphasis on policies as related to land use, character of population using facilities, access to areas and recreational needs. Prerequisite: Major or minor in Recreation and Parks.

**401. Camp Area Development. (2-2). Credit 3. I**

Study of camp area development with emphasis on design and layout of camping areas, facilities, needs, and construction and durability of facilities to meet requirements of the area. Prerequisites: R.P. 301, 302.

**402. Recreation Area Planning. (3-0). Credit 3. I**

Study of natural resources with particular emphasis on their use. Competitive aspects of multiple land use relative to area and regional planning of recreation. Prerequisites: R.P. 301, 302.

**403. Recreation and Parks Management. (3-0). Credit 3. II**

Study of management of recreation areas, parks, and other facilities with emphasis on measurement techniques on efficiency of area use, safety precautions needs and other methods to manipulate people on this area. Prerequisite: R.P. 302.

### **Department of Soil and Crop Sciences**

Professors Blackhurst, Bloodworth (Head), Brown, Craigmiles, DeWerth, Hampton, Holt, Kunze, McAfee, Perry, Runkles, Thomas; Associate Professors Burns, Gerard, Godfrey, Niles, Staten, Storey, Whiteley; Assistant Professors Anderson, Bowen, Fuqua, McBee, Mills, White; Instructor Clark

**101. Introduction to Soil and Crop Sciences. (1-0). Credit 1. I**

Brief summary of sciences of horticulture, floriculture, agronomic crops, and soils and water. Management, production, and processing of various crops considered along with education, employment, and research pertaining to respective professions.

#### **AGRONOMY SECTION**

**105. Fundamentals of Crop Production. (2-2). Credit 3. I, II**

Origin, early history, classification, and distribution of agronomic crops; influence of climate and soils on growth; germination, growth and development, and reproduction of crops; recommended cultural practices and importance of agronomic crops.

**301. Soil Science. (3-2). Credit 4. I, II, S**

Basic course in soil science which deals with principles of soil chemistry, physics, microbiology, fertility, and pedology. Prerequisites: Chem. 102 or 104; junior classification.

**304. Plant Breeding. (3-2). Credit 4. II**

Improvement of crops by hybridization and selection. Special breeding methods and techniques applicable to naturally self-pollinated, cross-pollinated, and asexually reproduced plants. Prerequisite: Gen. 301.

**305. Seed Technology and Commercial Grading. (2-3). Credit 3. II**

Study of important crop seeds with emphasis on harvesting, cleaning, and storage as they influence quality of planting seed. Grading of grain, cotton, and hay according to Federal standards. Prerequisites: Agro. 105; Biol. 101.

**306. Grain and Fiber Crops. (3-2). Credit 4. I**

Study of geographical distribution, classification, physiology, principles of production, and use of grain and fiber crops. Prerequisites: Agro. 105, 301; Biol. 101.

**308. Forage Crops. (2-2). Credit 3. I, II**

Production, utilization, and identification of major forage crop plants with emphasis on adapted species and varieties for Southwest. Prerequisites: Agro. 105, 301; Biol. 101.

**310. Soil Morphology. (1-3). Credit 2. II**

Field study of morphological features of soil profile in relation to soil utilization and management. Soil development, classification, and mapping. Prerequisite: Agro. 301.

**318. Soil Conservation. (3-3). Credit 4. I, II, S**

Study of physical and chemical deterioration of soils and basic land use treatment principles. Conservation farm plan developed emphasizing proper management of soils and crops.

**417. Pasture Management. (3-0). Credit 3. II**

Adaptation and management of native and introduced pasture plants; their establishment, production, utilization, and maintenance in permanent and temporary pastures. Field trips required. Prerequisite: Agro. 301.

**422. Soil Conditions and Plant Growth. (3-4). Credit 4. II**

Chemical, biological, and physical processes, activities, and conditions in soils as they influence plant growth. Prerequisites: Agro. 301; approval of instructor.

**426. Fertilizer Technology. (2-0). Credit 2. II**

Study of problems of manufacture, storage, and application of commercial fertilizers, including limited number of required field trips to various types of fertilizer plants. Prerequisite: Agro. 301.

**428. Turf Management. (2-2). Credit 3. II**

Study of fundamental and special problems in establishment, utilization, and management of turf grasses under varying use conditions. Field trips required. Prerequisites: Agro. 301; P.P.P. 301, 313.

**445. Soil Physics. (2-3). Credit 3. I**

Study of fundamentals of soil physics and their application to solution of problems in crop production, irrigation, and engineering. Prerequisites: Nine hours of soils and physics, with minimum of three hours of each (may include soil mechanics.)

**481. Agronomy Seminar. (1-0). Credit 1. I, II**

Preparation and presentation by students of papers on pertinent agronomic topics. Required of all agronomy majors in their last semester. Prerequisite: Senior classification in agronomy.

**485. Problems. Credit 1 to 4. I, II, S**

For advanced undergraduates to permit field or laboratory investigation or study of subject matter not included in established courses. Prerequisites: Ten hours of junior and senior agronomy.



## FOR GRADUATES

**601. Grain and Cereal Crops. (3-0). Credit 3. S**

Advanced study of grain and cereal ecology, utilization, physiology, and morphology, including critical review of world literature reporting recent investigations in this field.

**602. Forage Crops. (3-0). Credit 3. I**

Advanced study of forage production, utilization, ecology, physiology, and morphology. Factors affecting initiation of regrowth and seed and forage quality. Review of world literature reporting recent investigations in this field.

**605. Pedology. (3-0). Credit 3. I**

Advanced study of development, morphology, constitution, and classification of soils.

**617. Advanced Soil Physics. (3-3). Credit 4. II**

Physical constitution and properties of soil, including consistence and structure, aeration, soil water, and thermal relationships. Prerequisites: Agro. 445 or equivalent and a two-semester course in physics. (Offered in 1966-67 and in alternate years thereafter.)

**618. Advanced Soil Analysis. (2-3). Credit 3. II**

Designed to familiarize student with more difficult problems of soil analysis and interpretation of data. Prerequisite: Agro. 422. (Offered in 1965-66 and in alternate years thereafter.)

**624. Physical Chemistry of Soils. (3-3). Credit 4. I**

Physical chemistry of clay minerals and inorganic and organic soil colloids. Prerequisites: Agro. 617, 618, 626; Chem. 324. (Offered in 1966-67 and in alternate years thereafter.)

**626. Soil Mineralogy. (3-3). Credit 4. I**

Study of crystal structures and properties of more important agricultural and industrial clays combined with identification techniques involving X-rays, differential thermal analysis, and electron microscopy. (Offered in 1965-66 and in alternate years thereafter.)

**627. Soil Fertility Relationships. (2-0). Credit 2. II**

Advanced study of behavior of nutrient elements in soils and plants. Emphasis placed on nitrogen, phosphorus and potassium. Prerequisites: Agro. 422; P.P.P. 314. (Offered in 1966-67 and in alternate years thereafter.)

**681. Seminar. (1-0). Credit 1 each semester. I, II**

For graduate students and staff members in soils and crops. Presentation and discussion of special topics and research data in field of agronomy. Participation required of all graduate students in agronomy.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Advanced problems in some phase of agronomy not directly related to thesis or dissertation.

**691. Research. Credit 1 or more each semester. I, II, S**

Investigations leading to thesis or dissertation.

(See Gen. 612 for description of related course.)

## FLORICULTURE SECTION

**201. Principles of Floriculture. (2-2). Credit 3. I**

Introduction to scientific principles and practices involved in production, distribution, marketing and use of greenhouse and nursery crops, and the contribution these plants and plant products make to economy and to modern living. Prerequisite: Biol. 101.

**206. Woody Ornamental Plants. (2-2). Credit 3. I**

Study of better known woody ornamental trees and shrubs including identification, morphology, classification, nomenclature, and adaptability for use in landscape environments. Prerequisite: Biol. 101.

**307. Landscape Plant Materials. (2-2). Credit 3. II**

Study of special and lesser known groups of ornamental plants including azaleas, camellias, garden roses, bulbs, corms, tubers, and herbaceous flowering plants. Prerequisite: Flor. 206.

**319. Exotic Plants. (2-2). Credit 3. I**

Study of unusual and rare ornamental plants with special emphasis on those from tropic and subtropic zones of world. Ecology, taxonomy, and adaptability to both outdoor and indoor landscape use. Prerequisite: Flor. 307.

**424. Scientific Plant Propagation. (2-2). Credit 3. II**

Study of anatomical, morphological, and physiological considerations involved in regeneration of plants by sexual and asexual methods and their importance in technical procedures involved. Prerequisites: P.P.P. 301, 313.

**425. Landscape Maintenance and Construction. (3-3). Credit 4. I**

Principles and practices of grading, drainage, and construction of landscaped areas, preparation of specifications, cost estimating, soil preparation, transplanting operations, control of plant pests, pruning methods, and arboriculture. Prerequisite: Flor. 307.

**429. Nursery and Greenhouse Crops. (3-3). Credit 4. II**

Application of basic plant sciences to principles and practices involved in production, harvesting, grading, and distribution of plants grown in modern nurseries, greenhouses, other forcing structures, and in field. Prerequisites: P.P.P. 301, 313.

**432. Landscape Horticulture. (2-2). Credit 3. II, S**

Application of floriculture to modern living; to acquaint future home owners, agricultural extension agents, and vocational agriculture teachers with landscape arrangement and maintenance of home grounds and use of plants and flowers in home. Prerequisite: Junior classification.

**485. Special Problems. Credit 1 to 4. I, II, S**

Special problems in floricultural science, landscape horticulture, floral designing, or study of subject matter not included in established courses. Prerequisite: Senior classification or approval of Department Head.

**FOR GRADUATES****609. Taxonomy of Ornamental Plants. (2-2). Credit 3. I**

Specialized study of genera, species, varieties, and clons of woody and herbaceous ornamental plants including identification, structure, use, and adaptability to climatic conditions in Southwest. Problems in taxonomy, physiology, and anatomy of these plants.

**610. Tropical Foliage Plants. (2-2). Credit 3. II**

Intensive study of rare and exotic plants of tropical and subtropical regions of world. Identification, adaptation, cultural requirements, propagation, and economic importance. Specific problems in taxonomy, physiology, and anatomy of these plants.

**615. Greenhouse Problem Diagnosis. (2-0). Credit 2. I**

Diagnosis of routine problems encountered in management and maintenance of greenhouse facilities. Problems involved in propagation, care, and analysis of plants grown in greenhouses for scientific investigations. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Individual problems or research not pertaining to thesis or dissertation. Prerequisite: Approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis or dissertation.

**HORTICULTURE SECTION****201. General Horticulture. (3-0). Credit 3. I, II**

Structure, growth, and development of horticultural plants. Control of environment and plant growth with considerations of biological competition and progressive improvement of crops. Practice in basic principles of propagation and greenhouse production of horticultural crops. Prerequisite: Biol. 101.

**311. Processing Horticultural Crops. (2-3). Credit 3. I**

Study of principles and practices of canning, quick freezing, dehydration, pickling, and juice manufacture of fruits and vegetables. Fundamental concepts of various techniques of preparation, processing, packaging, and use of additives. Processing plants visited.

**319. Orchard Management. (2-2). Credit 3. II**

Study of rootstocks, varieties, sites, pruning, temperature, dormancy, soil management, nutrition, chemical fruit thinning, harvesting, storage, insects, and diseases of peaches, plums, and pears. Prerequisite: Hort. 201. (Offered in 1966-67 and in alternate years thereafter.)

**322. Vegetable Crops Management. (2-3). Credit 3. I**

Factors influencing vegetable crop production; climate, soil, variety, plant growing, transplanting, planting, irrigation, weed, insect and disease control, harvesting, marketing, storage, greenhouse vegetable production. (Offered in 1966-67 and in alternate years thereafter.)

**418. Nut Culture. (1-3). Credit 2. II**

Study of orchard management, native grove development, varieties, fruit setting, soils, nutrition, propagation, pest control, harvesting, shelling, storage, and marketing with major emphasis on pecans.

**422. Citrus and Subtropical Fruits. (2-2). Credit 3. I**

Study of history, taxonomy, planting, irrigation, soil management, pruning, hardiness, packing, processing, post harvest physiology, and marketing of citrus and other subtropical and tropical fruits. (Offered in 1965-66 and in alternate years thereafter.)

**426. Commercial Propagation. (2-2). Credit 3. II**

Study of principles and practices followed in propagation of fruit trees. Study of graft union, congeniality between stocks and scions, adaption of stocks to environment, and propagation practices for important fruits.

**434. Grading and Packing Vegetables. (2-2). Credit 3. I**

Consideration of factors of good quality in market vegetables. Standard grades and packages. Shipping methods. Relation of production methods to quality. Transit losses. Methods of marketing open to producer. Recent trends in marketing and packaging.

**444. Laboratory Examination of Processed Food. (1-3). Credit 2. II**

Practice and theory in chemical, physical, microscopic, and microbiological methods of food analysis and interpretation of results. Federal and State regulations. Prerequisite: Approval of instructor.

**446. Commercial Fruit and Vegetable Canning. (2-3). Credit 3. II**

Advanced course in pilot plant and laboratory operations pertaining to production of canned fruits and vegetables. Prerequisite: Hort. 311.

**481. Seminar. (1-0). Credit 1 each semester. I, II**

Review of current experimental work in field of horticulture, presented by staff members, graduate, and senior students. Required of all senior students in horticulture.

**485. Problems in Horticulture. Credit 1 to 4. I, II, S**

Special problems in fruit and vegetable crop production and processing. Prerequisite: Senior classification or approval of Department Head.

**FOR GRADUATES****601. Environmental Relations of Fruit Plants. (3-3). Credit 4. I**

Principles of nutrition, water, and temperature related to management practices of fruits. Practice in soil moisture relationships, leaf analyses by flame spectrophotometry, and control of dormancy with growth regulators. (Offered in 1966-67 and in alternate years thereafter.)

**602. Factors Influencing Fruit Production. (3-3). Credit 4. II**

Influence of light, growth regulators, pruning, and structural factors on fruit setting. Chromatographic separation, spectrophotometric identification, biological assay of endogenous growth regulators, chemical fruit setting, and hybridization. (Offered in 1965-66 and in alternate years thereafter.)



**603. Structure of Vegetable Plants. (3-3). Credit 4. II**

Morphological and anatomical features of important groups of vegetable plants related to production and progressive improvement of crop.

**604. Physiology of Vegetable Plants. (3-3). Credit 4. I**

Nutrition, light, vernalization, seed treatment, water, and temperature related to fruit setting and vegetable production. Current developments in hormones, herbicides, and greenhouse vegetable production.

**681. Seminar. (1-0). Credit 1. I, II**

Student and staff participation in review of literature and reporting on current developments in research on production and processing of horticultural crops. Required of all graduate students in Horticulture.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Review of fundamental principles and methods in horticultural research. Practice involves instrumentation and techniques related to research problems.

**691. Research. Credit 1 or more each semester. I, II, S**

Research in horticultural problems for thesis or dissertation.

### Department of Statistics

Professor Hartley (Director); Associate Professors Dayhoff, Freund, Hocking, Rao;  
Assistant Professors Darroch, Jenkins; Instructors Broemeling, Ringer

**201. Elementary Statistical Inference. (2-2). Credit 3. I, II**

Elementary description of tools of statistical inference, including empirical and theoretical distributions, probability, sampling, treatment of both continuous and discrete data, regression and correlation, introduction to analysis of variance and applications to practical problems. Prerequisite: Math. 102 or equivalent.

**406. Statistical Methods. (2-2). Credit 3. I, II, S**

Non-mathematical introduction to concepts of random sampling and statistical inference; estimation and testing hypothesis of means and variances; analysis of variance; regression analysis; chi-square tests. Not to be used for graduate credit by Statistics majors. Prerequisite: Approval of instructor.

### FOR GRADUATES

**601. Statistical Analysis. (3-2). Credit 4. I, II**

Intended for students in engineering, physical, and mathematical sciences. Introduction to probability, probability distributions, and statistical inference;  $t$ ,  $F$  tests and analysis of variance; regression analysis; elements of experimental design. Prerequisite: Math. 122 or 210.

**603. Biological Statistics Including Bio-Assay. (3-0). Credit 3. II**

Bio-assay for quantitative and quantal responses; absolute and comparative potencies, dose, time-, and dose  $\times$  times response curves; stationary and dynamic models for biological populations, prey-predator studies. Prerequisite: Stat. 601 or 605.

**604. Special Problems in Statistical Computations and Analysis. (3-0). Credit 3. I**

Introduction to Fortran programming with emphasis on programming statistical analyses; efficient uses of existing statistical computer programs; generation of random numbers and statistical variables; programming of simulation studies; selected topics in statistical analysis not covered in Stat. 601 or 605. Prerequisites: I.En. 201; Stat. 601 or 605.

**605. Statistical Analysis. (3-3). Credit 4. I, II**

Intended for students in life, agricultural, and social sciences. Review of estimation and testing hypotheses; analysis of variance and covariance; simple, multiple, and curvilinear regression; introduction to experimental design; introduction to non-parametric methods. Prerequisite: Stat. 406 or equivalent.

**606. Design of Experiments. (2-3). Credit 3. II**

Fundamental principles of design and analysis of experiments; randomized blocks, Latin squares, split plots, factorial experiments; confounding; missing plot techniques. Prerequisite: Stat. 601 or 605.

**607. Sampling. (3-0). Credit 3. I**

Planning, execution, and analysis of sampling from finite populations; simple, stratified, multi-stage, and systematic sampling; ratio estimates. Prerequisite: Stat. 601 or 605.

**608. Least Squares and Regression Analysis. (3-0). Credit 3. II**

Regression analysis, simple, multiple, and curvilinear; orthogonal polynomials; analysis of non-orthogonal and incomplete experiments by least squares methods; computer methods for least squares problems. Prerequisite: Stat. 601 or 605.

**609. Order Statistics and Non-Parametric Methods. (3-0). Credit 3. II**

Use of order statistics and other distribution-free statistics for estimation and testing hypotheses, exact non-parametric tests and measures of rank-correlation. Prerequisite: Stat. 601 or 605.

**611. Theory of Statistics. (3-3). Credit 4. I**

The concept of probability, probability distribution, moment generating functions and limit theorem; the theory of estimation and testing hypotheses. Prerequisite: Math. 307.

**612. Theory of Linear Models. (3-0). Credit 3. I**

Theory of least squares; theory of general linear hypothesis and associated small sample distribution theory; analysis of multiple classifications. Prerequisites: Math. 416; Stat. 611.

**613. Intermediate Theory of Statistics. (3-0). Credit 3. I**

General theory of estimation and sufficiency, including maximum likelihood, minimum variance estimation; Neyman-Pearson theory of testing hypothesis; elements of decision theory. Prerequisites: Math. 409; Stat. 611.

**614. Advanced Theory of Statistics. (3-0). Credit 3. II**

Probability measures and distribution functions, random variables, characteristic functions, asymptotic distributions. Prerequisites: Math. 607; Stat. 613.

**615. Stochastic Processes and Time Series. (3-0). Credit 3. I**

Stationary and non-stationary stochastic processes, autoregressive processes and correlogram analysis, harmonic-periodogram and spectral analysis. Markoff and diffusion processes. Prerequisites: Math. 409, 601; Stat. 611.

**616. Multivariate Analysis. (3-0). Credit 3. I**

Multivariate normal distributions and multivariate generalizations of classical test criteria, Hotelling's T, discriminant analysis and elements of factor and canonical analysis. Prerequisites: Math. 409; Stat. 601 or 605, 611.

**617. Theory of Sampling. (3-0). Credit 3. II**

General randomization theory of multistage sampling of finite populations, sampling with and without replacement and with equal and unequal probabilities, ratio and regression estimates in multiphase sampling, analytic studies and multiframe problems. Prerequisites: Stat. 607, 611.

**621. Advanced Topics in Statistical Theory. (3-0). Credit 3. S**

Topics in statistical theory not provided for in other courses and readings of current research topics in statistical theory published in leading statistical journals. Prerequisites: Stat. 606, 608, 613.

**622. Advanced Topics in Statistical Methodology. (3-0). Credit 3. S**

Topics in statistical methodology not provided for in other courses and readings of current topics in statistical methodology published in leading statistical journals. Prerequisites: Stat. 606, 608, 612.

**625. Statistical Methods in Reliability. (2-3). Credit 3. S**

Statistical theories pertinent to solution of engineering problems in reliability introduced, established, and applied. Distribution and failure theory including exponential, log normal, gamma, and Weibull. Parameters studied include mean time to failure, failure rate, variances, and standard deviations, confidence limits, and tests of hypothesis. Prerequisites: I.En. 614; Stat. 601; or approval of instructor.

**626. Statistical Methods of Process Control and Optimization. (3-0). Credit 3. I**

Statistical theory and methods of modern stochastic control systems including those based on autoregressive Markoff and related dynamic models, adaptive optimization and control, evolutionary processes, response surface analysis including steepest ascent methods and associated statistical estimation theory. Prerequisites: I.En. 614; Stat. 601; or approval of the instructor.

**685. Problems. Credit 1 to 4. I, II, S**

Individual instruction in selected fields in Statistics; investigation of special topics not within scope of thesis research and not covered by other formal courses. Prerequisites: Graduate classification; approval of Department Head.

**691. Research. Credit 1 or more. I, II, S**

Research for thesis or dissertation. Prerequisite: Graduate classification.

## Structural Mechanics

**468. Statically Indeterminate Structures. (3-0). Credit 3. I**

Matrix algebra; basic structural principles; displacement analysis by real-work, differential-equation, Castigliano's first theorem, and auxiliary-load methods. Analysis of statically indeterminate structures by consistent-distortion method. Displacements of statically indeterminate structures. Treatment of beams, trusses, frames, and curved members. Prerequisite: Aero. 304 or C.E. 345.

**469. Analysis of Structures. (3-0). Credit 3. II**

Displacement analysis by moment-area, elastic-weights, conjugate-beam, virtual-work, and Williot-Mohr methods. Analysis of statically indeterminate structures by three-moment theorem, least-work, elastic-center, column-analogy, slope-deflection, moment-distribution, and relaxation methods. Treatment of beams, trusses, frames, and curved members. Prerequisite: S.M. 468.

**470. Experimental Mechanics. (2-3). Credit 3. II, S**

Mechanical and optical strain gages; brittle coatings; variable resistance strain gages; indicating and recording equipment; photoelasticity, photoelastic coatings, motion measurement. Prerequisites: C.E. 305; E.E. 305 or 307.

## FOR GRADUATES

**601. Theory of Elasticity. (4-0). Credit 4. I, S**

Study of analysis of stress and strain in two and three dimensions, equilibrium and compatibility equations, strain energy methods, torsion of noncircular sections, flexure, axially symmetric problems. Prerequisite: Math. 601 or registration therein.

**602. Structural Stability. (4-0). Credit 4. II**

Primary buckling of centrally or eccentrically loaded columns; primary buckling of centrally loaded columns by torsion; builtup columns; lateral buckling of beams; buckling of rings. Prerequisites: Math. 308; approval of instructor.

**603. Theory of Plates and Shells. (4-0). Credit 4. I**

Small-deflection thin plate theory for plates of various shapes and support conditions; bending of anisotropic plates; plates under combined lateral loads and in-plane forces; large-deflection thin plate theory; theory of shells; stability of plates and shells. Prerequisite: Math. 601 or registration therein.

**604. Vectors and Tensors in Mechanics. (2-0). Credit 2. I, S**

Unified study of continuous media using vectors and tensors.

**605. Flow and Fracture of Solids. (4-0). Credit 4. II**

Study of flow theories and fracture mechanisms of crystalline solids; plasticity; materials science applications to engineering; dislocation theory, fracture, creep, and fatigue.

**606. Theory of Thermal Stresses. (4-0). Credit 4. II**

Basic study of heat conduction, thermoelasticity and thermoinelasticity as related to thermal stresses. Prerequisites: S.M. 601; approval of instructor.

**607. Matrix Methods of Structural Analysis. (3-0). Credit 3. II, S**

Unified treatment of two- and three-dimensional frames by specialized matrix methods. Prerequisite: S.M. 468.



**608. Experimental Structural Analysis. (1-3). Credit 2. II, S**

Study of observations and measurements, dimensional analysis, prediction equations, and theory of similitude; design, construction, and use of structural models. Prerequisite: S.M. 468, 470 or registration therein.

**609. History of Structural Mechanics. (2-0). Credit 2. II, S**

Study of history of development of structural mechanics to present time. Prerequisite: Approval of instructor.

**610. Theory of Shells. (4-0). Credit 4. II**

Continuation of study of theory of shells introduced in S.M. 603. Limited to study of linear shell theory. Equations formulated using Lamé's surface parameters. Membrane analysis, bending analysis, and shallow shell theory. Prerequisite: S.M. 603.

### Department of Veterinary Anatomy

Professors Gibbs, Milliff (Head); Associate Professor Kemler; Assistant Professor Greeley; Instructors Garcia, Martin, Tatum

**202. Veterinary Anatomy. (1-6). Credit 3. II**

Osteology of horse and cow. Topographical dissection of cow. Histology of tissues and organs of cow. Prerequisite: Biol. 107 or equivalent.

**301. Anatomy. (1-9). Credit 4. I**

Osteology, dentition, and arthrology of domestic animals and topographical dissection of dog.

**302. Anatomy. (1-9). Credit 4. II**

Topographical dissection of cow and comparative study of horse, cat, and pig. Prerequisite: V.A. 301.

**303. Histology. (2-6). Credit 4. I**

Microscopic study of basic tissues and of organs, excluding organs of reproduction.

**304. Embryology. (2-6). Credit 4. II**

Microscopic study of reproductive organs of domestic animals, and of serial sections of chick and pig embryos. Prerequisites: V.A. 301, 303.

**406. Neuroanatomy. (0-6). Credit 2. III**

Gross and microscopic anatomy of nervous systems of domestic animals. Prerequisite: V.A. 303.

**501. Applied Anatomy. (1-6). Credit 3. III**

Anatomy of areas of surgical and clinical importance in domestic animals. Prerequisite: V.A. 302.

### FOR GRADUATES

**601. Veterinary Anatomy. (1-9). Credit 4 each semester. I, II**

Topographical dissection of domestic animals. Prerequisite: V.A. 302.

**602. Veterinary Anatomy. (2-6). Credit 4. I, II**

Microscopic structure of anatomical systems of domestic animals. Prerequisite: V.A. 303.

**603. Neuroanatomy. (2-6). Credit 4. II**

Study of gross, developmental, and microscopic anatomy of nervous systems of domestic animals. Prerequisite: V.A. 406.

**604. History of Anatomy. (1-0). Credit 1. I, II, S**

Discussion of biographies and contributions to field of anatomy of most important anatomists from 500 B.C. to present. Prerequisite: Graduate major in veterinary anatomy.

**681. Seminar. (1-0). Credit 1. S**

Review and discussion of current scientific work in anatomy and related subjects. Prerequisite: Graduate major or minor in veterinary anatomy.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Problems in either gross or microscopic anatomy along lines chosen by individual. Prerequisites: V.A. 406; approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Original research on selected thesis problem in anatomy. Prerequisite: Graduate major in veterinary anatomy.

## Veterinary Clinics

**501. Clinics. (0-27). Credit 9. I**

Groups participate on rotating schedule in various areas:

**(1). Large Animal Clinics**

Students required to assume full responsibility for diagnosis, care, and treatment of patients assigned under supervision of instructors. Special emphasis given daily to selected clinical cases.

**(2). Small Animal Clinics**

Students required to assume full responsibility for diagnosis, care, and treatment of patients assigned under supervision of instructors. Special emphasis given daily to selected clinical cases.

**(3). Ambulatory Clinics**

Under supervision of instructor, students are taken on calls to private farms or university herds for training and experience in diagnosis and treatment of animal diseases under actual farm and ranch conditions.

**(4). Clinical Laboratory and Radiology**

Practice in routine laboratory procedures including hematology, urine analysis, radiography, and radiation therapy.

**(5). Poultry Diagnosis**

Supervised practice in diagnosis and treatment of poultry diseases using actual submissions to Poultry Disease Laboratory. Library research and report writing.

**(6). Applied Pathology**

Supervised participation in pathological examinations of diseased animals and their tissues through use of necropsy, biopsy and related techniques with emphasis on interpretation of observations and on technical methods.

**(7). Clinical Parasitology**

Laboratory methods utilized in diagnosis of parasites and parasitic diseases of domestic and wild animals and birds.

**(8). Food Hygiene and Public Health**

Routine inspection procedures of foods of animal origin. Epidemiology problems and regulatory control of animal diseases.

Prerequisite: V.M.S. 573.

**502. Clinics. (0-27). Credit 9. II**

Continuation of V.C. 501. Prerequisite: V.C. 501.

**503. Clinics. (0-30). Credit 10. III**

Continuation of V.C. 502. Prerequisite: V.C. 502.

## Department of Veterinary Medicine and Surgery

Professors Banks, Calliham (Head), Ramge, Redmond; Associate Professors Ellett, Piermattei, Romane; Assistant Professors Boyd, Denton, Evers, Gowing, Hobson, Hurov, Titus, Young; Instructors Bell, Bullard, Jones, Scott; Leturer Price

**311. History of the Veterinary Profession. (1-0). Credit 1. I**

History of development of veterinary art and science, veterinary education, veterinary societies and regulatory agencies, and professional veterinary medicine.

**412. Radiology. (2-0). Credit 2. I**

Provides student with foundation of veterinary radiology. Includes physical properties and production of ionizing radiation, roentgenographic and darkroom procedures, hazards and protection from excessive radiation, and basic principles and uses of radiation as therapeutic agent. Prerequisite: V.Pat. 443.

**570. General Surgery. (2-3). Credit 3. II**

Principles of anesthesia, surgery, and dentistry of domestic animals. Prerequisites: V.Pat. 444; V.P.P. 430.

**571. Diseases of Small Animals. (5-0). Credit 5. II**

Study of infectious and non-infectious diseases of small animals. Prerequisite: V.M.S. 412.

**572. Clinical Medicine. (0-3). Credit 1. II**

Clinical practices, restraint of animals, and diagnostic procedures. Prerequisite: V.M.S. 412.

**573. Obstetrics and Reproduction Diseases. (3-3). Credit 4. III**

Genital and reproductive diseases including prevention, diagnosis, and treatment; pregnancy diagnosis, obstetrics, and diseases of newborn. Prerequisite: V.P.P. 429.

**574. Diseases of Large Animals. (5-0). Credit 5. III**

Etiology, diagnosis, prognosis, treatment, and prevention of infectious and non-infectious diseases common to all farm animals and those specific to horses and swine. Prerequisites: V.M.S. 412; V.Pat. 548.

**575. Operative Surgery. (2-4). Credit 3. III**

Correction of diseases by surgery. Application of art and science in surgical principles and techniques. Prerequisite: V.M.S. 570.

**576. Clinical Medicine. (0-3). Credit 1. III**

Application of arts of clinical medicine. Prerequisite: V.M.S. 572.

**577. Diseases of Large Animals. (3-0). Credit 3. I**

Etiology, diagnosis, prognosis, treatment, and prevention of infectious and non-infectious diseases of ruminant animals. Prerequisite: V.M.S. 574.

**578. Laboratory and Domestic Animal Health Management. (4-0). Credit 4. II**

Environmental conditions necessary for health of laboratory animals, poultry, small animals, and livestock. Prophylactic practices in nutrition, sanitation, and disease control. Prerequisites: An.Sc. 320; V.M.S. 574.

**579. Practice Management. (2-0). Credit 2. III**

Business principles, management practices, economic factors, and ethics of veterinary medical practice. Prerequisite: V.M.S. 576.

**581. Clinical Seminar. (1-0). Credit 1. II**

Various aspects of special or complicated diseases presented by panel from staff of College of Veterinary Medicine. Students participate with staff in discussions of case and material. Presentations and discussions based primarily on cases submitted to Veterinary Hospital. Prerequisite: V.C. 501.

**582. Clinical Seminar. (1-0). Credit 1. III**

Continuation of V.M.S. 581. Prerequisite: V.C. 502.

(See V.C. 501, 502, 503 for descriptions of related courses.)

**FOR GRADUATES****603. Veterinary Surgery. Credit 1 to 8 each semester. I, II**

Special surgery of large or small animals. Prerequisite: Degree of Doctor of Veterinary Medicine.

**612. Diagnostic Radiology. Credit 2 or 3 each semester. I, II, S**

Radiographic interpretation of large and small animals with special emphasis on film reading. Use of special techniques including contrast media and diagnostic aids discussed and demonstrated. Prerequisite: Degree of Doctor of Veterinary Medicine.



**621. Reproduction Diseases of Female Domestic Animals. (2-0). Credit 2. I, II, S**

Advanced study of diagnosis, treatment, and control of diseases primarily affecting reproduction in female domestic animal. Prerequisite: Degree of Doctor of Veterinary Medicine.

**622. Veterinary Andrology. (2-0). Credit 2. I, II, S**

Advanced study of diagnosis, treatment, and control of diseases primarily affecting reproduction in male domestic animal, including study of evaluation of semen and its preparation for use by artificial insemination. Prerequisite: Degree of Doctor of Veterinary Medicine.

**685. Problems. Credit 1 to 8 each semester. I, II**

Original investigations of problems in field of surgery, therapeutics, or radiology. Prerequisite: Degree of Doctor of Veterinary Medicine.

**691. Research. Credit 1 or more each semester. I, II**

Research for thesis.

### Department of Veterinary Microbiology

Professors Grumbles (Head); Jungerman; Associate Professors Franklin, Hall, Moore; Assistant Professors Huff, Livingston; Instructors Grimes, Ranck, Vera

**301. Microorganisms in Animal Diseases. (2-4). Credit 3. I**

Study of function of microorganisms in maintaining health and causing diseases in domestic animals. Rumen microflora. Preservation and spoilage of meat. Methods by which infectious diseases are transmitted and prevented. Study of selected groups of pathogens and specific diseases. Prerequisite: Biol. 206.

**334. Poultry Diseases. (2-2). Credit 3. II**

Poultry sanitation and diseases. Prevention and control of environmental, nutritional, parasitic, and contagious diseases. Prerequisite: Biol. 206. (Offered in 1966-67 and in alternate years thereafter.)

**335. Microbiology. (3-5). Credit 5. II**

Principles of bacteriology, infection, and immunity. Morphology, physiology, antigenic structure, and identifying characteristics of bacteria studied in detail. Consideration given to production of antibiotics and biologicals. Mechanism of infections and fundamentals of immunity studied and correlated.

**436. Microbiology. (3-5). Credit 5. III**

Comprehensive study of pathogenic microorganisms and their role in causing disease. Special emphasis given to antigenicity and relation of each organism to immune phenomena. Laboratory diagnosis and species identification stressed. Prerequisite: V.Mi. 335.

**438. Virology and Serology. (2-3). Credit 3. I**

Detailed study of nature of viruses and Rickettsiae including their propagation, isolation, and identification. Reaction between virus and host cell. Theories, principles, and use of serologic procedures for identifying infectious agents, making a diagnosis, and measuring antibody response. Prerequisite: V.Mi. 436.

**485. Problems. Credit 1 to 3. I, II, S**

Directed, individual study of selected problem in veterinary microbiology approved by instructor. Prerequisite: Approval of Department Head.

**595. Poultry Diseases. (2-0). Credit 2. I**

Study of avian diseases with emphasis on those of greatest economic importance. Prerequisite: V.Mi. 438.

(See V.C. 501, 502, 503 for descriptions of related courses.)

### FOR GRADUATES

**643. Veterinary Microbiology. (3-4). Credit 4. I, II**

Study of pathogenic microorganisms; their cultural and biological characteristics and pathogenicity.

**646. Avian Virus Diseases. Credit 1 to 4. I**

Study of viral diseases of poultry including methods of isolation and identification of causative agents. Practice consists of conducting post mortem examinations and special diagnostic procedures on birds received daily for necropsy. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**647. Veterinary Virology. Credit 1 to 4. II**

Detailed study of virus infections in animals, including types of infections, mode of transmission, intracellular pathology, epidemiology, isolation and identification of inciting agents. Practice includes tissue cultivation, animal inoculations, and diagnostic tests. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**648. Veterinary Mycology. Credit 1 to 4. II**

Study of actinomycetes, yeasts, and molds that are pathogenic to man and animals; morphology, cultural characteristics, pathogenicity and identification. Practice consists of exercises in cultural methods, morphological characteristics, biochemical reactions and diagnosis. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**649. Immunology. (3-3). Credit 4. I**

Comprehensive study of various immune phenomena correlated with study of biological production, potency, and safety testing. Prerequisites: V.Mi. 335, 438, or equivalent.

**681. Seminar. (1-0). Credit 1. I, S**

Review and discussion of current scientific work and research in field of microbiology and related subjects. Prerequisite: Graduate major or minor in microbiology or related fields.

**685. Problems. Credit 1 to 4 each semester. I, II**

Problems course in microbiology. Prerequisites: Degree of Doctor of Veterinary Medicine; approval of Department Head.

**691. Research. Credit 1 or more. I, II**

Research for thesis or dissertation.

## Department of Veterinary Parasitology

Professor Turk (Head); Associate Professors Bell, Galvin; Assistant Professor Smith

**483. Parasitology. (2-2). Credit 3. III**

Study of more important and commonly-occurring parasites and parasitic diseases of domestic animals. Practice consists of laboratory and diagnostic methods used in parasitology, utilizing fresh and preserved material obtained from field, clinics, and necropsies. Signs, diagnosis, treatment, and control of parasitic diseases emphasized. Prerequisite: V.A. 302.

**484. Parasitology. (2-2). Credit 3. I**

Study of more important and commonly-occurring parasites and parasitic diseases of domestic animals. Helminth, protozoan, and arthropod parasites and diseases. Signs, diagnosis, treatment, and control emphasized. Prerequisite: V.Par. 483.

**487. Parasites of Farm Animals and Poultry. (2-2). Credit 3. II**

Study of some of more important internal and external parasites of domestic animals and poultry. Life cycles, pathogenicity, and economic and public health aspects stressed with suggested methods for control. Open to agricultural students. Prerequisite: Senior classification.

(See V.C. 501, 502, 503 for descriptions of related courses.)

### FOR GRADUATES

**601. Parasitology. Credit 1 to 4 each semester. I**

Detailed study of more important helminth parasites of domestic animals, including their identification, distribution, and life history. Prerequisite: V.C. 503 or equivalent.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Special problems concerned with parasites of domestic animals or poultry. Prerequisites: V.Par. 601 or equivalent; approval of instructor.

- 691. Research. Credit 1 or more each semester. I, II, S**  
Research for thesis.

### Department of Veterinary Pathology

Professors Bridges (Head), Dollahite, Gleiser, Kuttler, Maurer; Associate Professor Pierce; Assistant Professors Feldman, Robinson; Instructors Brown, O'Hara, Rogers

**443. General Pathology. (4-3). Credit 5. III**

Elementary disease processes and their causes, including study of gross and minute appearance of diseased tissue. Such processes as inflammation, necrosis, gangrene, atrophy, hypertrophy, ulceration, various degenerations, infiltrations, pigmentations, and tumor formations are considered. Practice consists of microscopic study of these processes and instruction in laboratory technique. Prerequisite: V.A. 302, 304.

**444. Special Pathology. (4-3). Credit 5. I**

Lectures on special pathology of organs and systems. Infectious and non-infectious diseases. Mechanism of development of lesions and their relationship to clinical signs emphasized. Lectures illustrated liberally with color slides. Laboratory work consists of studies in gross and microscopic pathology. Prerequisite: V.Pat. 443.

**548. Nutritional and Metabolic Diseases. (3-0). Credit 3. II**

Clinical manifestations, pathologic physiology, pathologic morphology, and causative mechanisms involved in various nutritional and metabolic diseases of animals. Prerequisites: B.N. 312; V.Pat. 444; V.P.P. 427.

**549. Clinical Pathology. (2-0). Credit 2. I**

Interpretation of qualitative and quantitative changes in body fluids, secretions, excretions, and exudates in diagnosis of disease. Prerequisites: B.N. 312; V.Pat. 444.

**585. Problems in Pathology. Credit 1 to 4 each semester. I, II, S**

Elective course for undergraduates who wish to supplement standard required courses. Problems assigned in gross or microscopic pathology or in pathological technique. Prerequisites: V.P. 443; approval of instructor.

(See V.C. 501, 502, 503 for descriptions of related courses.)

### FOR GRADUATES

**643. Gross Pathology. Credit 1 to 6. I, II, S**

Student studies gross pathological changes at necropsies performed daily. Follows selected tissues through suitable histopathological techniques and corrects gross diagnosis in light of microscopic findings. Confirmatory bacteriologic methods utilized where indicated. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**644. Locomotor and Skeletal Diseases. Credit 1 or 2. I, S**

Changes taking place in diseased bones, joints, and muscles studied with respect to their nature and probable causes, and with special reference to lameness of horse. Frequent use made of Mark Francis Collection of Bone and Joint Pathology. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**645. Neoplastic Diseases. Credit 1 to 8. I, II, S**

Theoretical histopathological and clinical aspects of neoplasia. Diagnosis of neoplastic and related conditions in all species. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**646. Nutritional Diseases. Credit 2 to 4. II**

Gross and microscopic tissue changes found in experimentally produced nutritional deficiencies are considered in comparison with clinically encountered deficiencies and with other conditions from which they must be differentiated. Prerequisite: Degree of Doctor of Veterinary Medicine or other suitable preparation.

**647. Metabolic Diseases. Credit 1 or 2. S**

Pathology of diseases due to major disorders of metabolism, non-nutritional and non-infectious. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**648. Reproductive Diseases. Credit 1 to 4. S**

Theoretical and practical pathology of gross and microscopic lesions in reproductive organs with especial reference to bovine sterility. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.



**649. Gross Post-Mortem Diagnosis. Credit 1 to 6. I, II, S**

Advanced training in recognition, interpretation, and description of tissue changes encountered. Specific diagnosis are derived and defended. Prerequisites: At least 4 semester hours of credit in V.Pat. 643.

**650. Neuropathology of Animals. Credit 1 to 4. I, S**

In addition to study and interpretation of gross and microscopic lesions of central and peripheral nervous systems, major attention given in theory and practice to special laboratory techniques necessary to demonstrate such lesions. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**651. Microscopic Diagnosis. Credit 1 to 6. I, II, S**

Advanced training in diagnosis, applied especially to "problem" cases currently encountered in Department's pathological diagnostic service. Routine and special histopathological methods employed. Prerequisites: Total of at least 10 semester hours of credit in V.Pat. 643, 645.

**658. Pathological Technique. Credit 1 to 6. I, II, S**

Art and science of preparing animal tissues, fluids, and exudates for microscopic or other special examination. Enrollment limited to number who can be accommodated in routine of departmental laboratory. Prerequisite: Fair knowledge of general chemistry.

**659. Sheep Diseases. Credit 1 to 4. I**

Pathology, etiology, and symptomatology of economically important diseases affecting sheep in all major sheep-producing countries of world. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**681. Seminar (1-0). Credit 1. I, II, S**

For graduate and special students in veterinary pathology. Presentation and discussion of special topics and research data concerning pathology and pathogenesis of diseases. Prerequisite: Approval of Department Head.

**685. Problems. Credit 1 to 4. I, II, S**

Advanced special problems concerned with pathogenesis and pathology of disease. Prerequisite: V.Pat. 444 or equivalent; approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Research reported by writing of thesis or dissertation as partial requirement for Master of Science or Doctor of Philosophy degree.

## **Department of Veterinary Physiology and Pharmacology**

Professors Burns (Head), Davis; Associate Professor McCrady; Assistant Professors Clark, McMurphy, Szabuniewicz

**323. Physiology of Farm Animals. (2-2). Credit 3. II**

Consideration of physiology essential to understanding of diseases of farm animals. For students in agriculture. Prerequisites: Chem. 228 or 231; V.A. 202.

**326. Physiology. (3-3). Credit 4. II**

Introduction to physiology, physicochemical basis of cellular physiology, dynamics of nerve and muscle, functions of circulatory system. Prerequisites: B.N. 312; registration in V.A. 302 and 304.

**427. Physiology. (3-3). Credit 4. III**

Functions of respiratory system, renal function and acid-base balance, mechanisms of digestion, absorption and excretion, metabolism and energy exchange, minerals and vitamins, neurophysiology. Prerequisite: V.P.P. 326.

**429. Endocrinology. (2-3). Credit 3. I**

Introduction to endocrinology, physiology and biochemistry of endocrine secretions, reproductive processes of domestic animals. Prerequisite: V.P.P. 427.

**430. Pharmacology. (3-3). Credit 4. I**

Pharmacologic principles; central nervous system depressants and stimulants; local anesthetics; autonomic drugs; skeletal muscle relaxants; anti-histaminics. Practice consists of study of action of drugs on experimental animals. Prerequisite: Registration in V.P.P. 429.

**529. Pharmacology. (3-3). Credit 4. II**

Agents affecting blood formation and coagulation; cardio-vascular drugs; locally-acting drugs; expectorants and antitussives; gastrointestinal agents; water, ions, and nutrients, blood derivatives and plasma substitutes; diuretics; local and systemic anti-infectives; parasitocides; hormones; uterine stimulants and sedatives. Practice consists of exercises in pharmacodynamics, bio-assay, metrology, pharmaceutical arithmetic, compounding and dispensing. Prerequisite: V.P.P. 430.

**530. Toxicology. (3-2). Credit 4. III**

Occurrence, signs, symptoms, lesions, treatments; prevention and management of inorganic and organic poisonings. Clinical manifestations, lesions and management of animals affected by poisonous plants. Practice consists of observing response of animals to poisons; therapy; chemical detection of common poisons. Prerequisite: V.P.P. 529.

**585. Problems in Physiology. (0-3). Credit 1. I, II, III**

Course for undergraduate students who desire additional laboratory work in physiology to supplement required courses. Prerequisite: V.P.P. 529.

**FOR GRADUATES****601, 602. Animal Physiology. (3-3). Credit 4 each semester. I, II**

Recent phases of physiology; modern experimental methods. Work arranged to suit needs of student and in harmony with his previous training. Prerequisite: Basic courses in morphology and organic chemistry.

**603. Veterinary Endocrinology. (3-3). Credit 4. I**

Study of physiology, biochemistry, and pharmacology of the endocrines. Laboratory emphasizes a number of classical experiments with clinical application. Prerequisites: Basic courses in morphology, physiology, and organic chemistry.

**605, 606. Veterinary Toxicology. (3-3). Credit 4 each semester. I, II**

Original investigations and detailed studies of poisons or poisonous plants and their effects on domestic animals. Prerequisite: V.P.P. 530.

**607, 608. Veterinary Pharmacology. (3-3). Credit 4 each semester. I, II**

Modern methods of research in pharmacology and pharmaceutical processes. Original research in studying actions and uses of drugs. Prerequisite: V.P.P. 529.

**611, 612. Veterinary Physiology. (3-3). Credit 4 each semester. I, II**

Detailed study of specific phases of physiology of domestic animals. Prerequisites: V.A. 304; V.P.P. 429.

**685. Problems. Credit 1 to 4 each semester. I, II**

Problems in physiology, pharmacology, or toxicology. Prerequisite: Degree of Doctor of Veterinary Medicine or appropriate specialized training.

**691. Research. Credit 1 or more each semester. I, II**

Original investigations in veterinary physiology, pharmacology, or toxicology to be submitted by writing of thesis as partial fulfillment for Master of Science degree. Prerequisite: Approval of Department Head.

**Department of Veterinary Public Health**

Professor Flowers (Head); Associate Professor Russell; Instructor McBride

**590. Food Hygiene. (2-2). Credit 3. III**

Study of dairy industry as related to public health and practice of veterinary medicine. Quality tests, sanitation, and legal control methods. Prerequisite: V.Pat. 548.

**591. Food Hygiene. (2-0). Credit 2. I**

Study of hygienic methods, regulations, and inspection procedures governing processing of foods of animal origin. Prerequisite: V.P.H. 590.

**594. Principles of Epidemiology. (2-3). Credit 3. II**

Basic principles and methods of epidemiology with application to zoonanthroponotic diseases. Prerequisite: V.P.H. 591.

**595. Public Health. (3-0). Credit 3. III**

Public health organization, administration, and methods of disease investigation and control with special emphasis on veterinary public health. Prerequisite: V.P.H. 594. (See V.C. 501 for description of related course.)

**FOR GRADUATES****601. Food Hygiene. (3-4). Credit 4. I**

Study of causes and evidence of spoilage, and detection of adulterants in fresh, canned, and cured foods of animal origin. Prerequisite: V.P.H. 591 or 595.

**685. Problems. Credit 1 to 4 each semester. I, II**

Problems course in veterinary public health. Prerequisite: Degree of Doctor of Veterinary Medicine or approval of Department Head.

**Department of Wildlife Science**

Professors Baldauf (Acting Head), Davis; Assistant Professors Carter, Inglis, Teer

**201. Wildlife Conservation and Management. (3-0). Credit 3. I, II**

Introduction to wildlife and fishery resources of United States with special reference to Texas. Account of what has happened to North American wildlife with consideration of specific plans and methods for its rehabilitation, maintenance, and increase.

**202. Natural History of the Vertebrates. (2-2). Credit 3. II**

Natural history of fishes, amphibians, reptiles, birds and mammals, as exemplified by selected representatives of each group. Not open to wildlife science majors.

**300. Field Studies. Credit 3. S**

Wildlife survey of selected areas. Studies of plant-animal interrelationships, birds, mammals, and other native vertebrates; experience in collecting and preparing study skins of birds, mammals, reptiles, and amphibians. Prerequisite: Junior classification or approval of Department Head.

**304. Conservation and Management of Fishes. (3-0). Credit 3. II**

Classification, habits, economic importance, and conservation of fishes. Not open to wildlife science majors.

**311. Ichthyology. (Fresh Water). (2-3). Credit 3. I**

Designed to familiarize student with fresh-water fishes of world. Subject matter will be mainly systematic, but evolution, ecology, life history, and economy of more important species will be treated. Prerequisite: Biol. 107.

**312. Ichthyology. (Marine). (2-3). Credit 3. S**

Study of marine fishes of world, emphasizing fishes of Texas. Life history, ecology, distribution, evolution, and economic values of important species. Prerequisite: W.S. 311 or approval of instructor. (Offered at the Marine Laboratory, Galveston.)

**315. Herpetology. (2-2). Credit 3. II**

Introduction to study of structure, adaptation, classification, distribution, and economic importance of amphibians and reptiles. Prerequisite: Biol. 107.

**316. Field Herpetology. (0-3). Credit 1. II**

Field work involving collection and preservation of herpetological specimens; natural history; ecological relations. Prerequisite: W.S. 315 or registration therein.

**400. Fisheries Survey. Credit 4. S**

Distribution, identification, field and laboratory techniques. Prerequisite: Junior classification or approval of Department Head. (Offered at the Marine Laboratory, Galveston.)

**401. General Mammalogy. (2-2). Credit 3. I**

Study of structure, classification, and economic relations of mammals. Foundation for wildlife science, also for museum work. Prerequisite: Biol. 107.

**402. General Ornithology. (2-2). Credit 3. II**

Introduction to study of birds, their structure, classification, geographic distribution, ecologic relations, and economic status. Foundation for wildlife science, also for museum work. Prerequisite: Biol. 107.



**403. Animal Ecology. (2-3). Credit 3. I**

Composition, structure, and energy relationships of plant-animal communities. Interaction of physical and biotic factors as they affect population levels and community development. Prerequisite: R.S. 316 or approval of instructor.

**408. Techniques of Wildlife Management. (2-3). Credit 3. II**

Methods and techniques in maintaining and increasing desirable wildlife and regulating populations generally, with emphasis on practical aspects.

**410. Conservation and Management of Fishes. (3-0). Credit 3. II**

Basic knowledge from ichthyology, biology of fishes, and limnology related to applied aspects of fresh water and marine fishery science. Emphasis placed on methods of fish culture, habitat and population manipulation, and fundamentals of farm pond management.

**416. Animal Population Dynamics. (2-2). Credit 3. II, S**

Study of modern theory of population dynamics, ecology, and exploitation with particular attention to growth forms of populations, reproduction and rates of increase, mortality, regulation and yield of natural populations. Prerequisite: Stat. 201 or 406 or approval of instructor. (Summer offerings for fisheries majors at Marine Laboratory, Galveston.)

**417. Biology of Fishes. (2-2). Credit 3. I**

Treats biology of fishes, including respiration, sense organs, feeding habits, breeding habits, anatomy, and adaptations to environment. Emphasis placed upon various physiological and morphological features of fishes. Prerequisite: Biol. 107.

**485. Wildlife Problems. Credit 1 to 3. I, II, S**

Individual study and research on selected problem approved by instructor. Prerequisite: Junior or senior classification.

**FOR GRADUATES****601, 602. Vertebrate Systematics. (1-6). Credit 3 each semester. I, II**

Theory and practice of taxonomy as applied to vertebrates. Prerequisites: W.S. 311, 315, 401, or 402, depending on group selected. (Offered in 1966-67 and in alternate years thereafter.)

**603. Vertebrate Ecology. (1-6). Credit 3. II**

Ecology and life histories of vertebrates with special reference to birds and mammals. Considerations given to community and environmental relations. Prerequisite: W.S. 403 or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**608. Techniques of Wildlife Management. (2-0). Credit 2. II**

Special techniques and current development in wildlife management practices. Prerequisite: W.S. 408 or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**609. Wildlife Research Methods. (2-0). Credit 2. I**

Study of research methods applied to wildlife management. (Offered in 1966-67 and in alternate years thereafter.)

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Important current developments in wildlife field with special reference to literature.

**685. Problems. Credit 2 to 6 each semester. I, II, S**

Credit adjusted in accordance with requirements of each individual case.

**691. Research. Credit 1 or more each semester. I, II, S**

Original research on selected wildlife problem to be used in thesis or dissertation.

## FACULTY

(Correct as of October 1, 1965)

(Figures in parentheses indicate date of first appointment on the University Staff and date of appointment to present position respectively.)

- Abbott, John Paul, Distinguished Professor of English. (1926, 1956) B.A., Vanderbilt, 1925; Ph.D., Iowa, 1939.
- Abdo, George Edgar, Instructor in Mathematics. (1964) B.A., Rice Institute, 1958; M.S., Texas A&M, 1961.
- Adamson, Arthur Douglas, Professor of Health and Physical Education. (1939, 1949) B.S., Texas A&M, 1939; M.S., 1944.
- Adkins, William G., Research Economist, Texas Transportation Institute. (1964) B.S., Texas A&M, 1951; M.S., 1953; Ph.D., 1963.
- Adkisson, Perry Lee, Professor of Entomology. (1958, 1963) B.S., Arkansas, 1950; M.S., 1954; Ph.D., Kansas State College, 1956.
- Aldred, William Hughes, Assistant Professor of Agricultural Engineering. (1953, 1957) B.S., Georgia, 1951; M.S., Texas A&M, 1956.
- Alexander, Robert Benjamin, Associate Professor of Chemistry. (1952, 1959) B.A., Baylor, 1945; M.A., 1946; Ph.D., Texas A&M, 1957.
- Allen, Edwin Ernest, Instructor in Architecture. (1964) B.Arch., Texas A&M, 1954.
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- Amin, Jagdish Vaghjibhai, Assistant Professor of Plant Sciences. (1963) B.S., Bombay, 1947; M.S., 1950; M.S., Michigan State College, 1953; Ph.D., Texas A&M, 1957.
- Anderson, Clifton Einar, Instructor in Government. (1962) B.S., Wisconsin, 1947; M.A., California, 1954.
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- Anderson, John Quincy, Professor of English and Head of Department. (1953, 1962) A.B., Oklahoma Agricultural and Mechanical College, 1939; M.A., Louisiana State, 1948; Ph.D., North Carolina, 1952.
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- Applegate, Howard George, Associate Professor of Plant Physiology and Pathology. (1963) B.S., Colorado State, 1950; M.S., 1952; Ph.D., Michigan State, 1956.
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- Ashcraft, Allan Coleman, Associate Professor of History. (1956, 1965) B.A., Texas A&M, 1950; M.A., Columbia, 1951; Ph.D., 1960.
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- Atwell, Buddy Houston, Instructor in Geophysics. (1962) B.S., Texas A&M, 1960.
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- Brown, Sidney Overton, Professor of Biology. (1936, 1949) B.A., Texas, 1932; Ph.D., 1936.
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- Byers, Horace Robert, Distinguished Professor of Meteorology and Acting Head of Department; Dean of College of Geosciences. (1965) A.B., California, 1929; M.S., Massachusetts Institute of Technology, 1932; D.Sc., 1935.
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- Cannon, Dennis P., Lieutenant, Instructor in Marine Transportation, Texas Maritime Academy. (1963) B.S., United State Merchant Marine Academy, 1953; Licensed Master Mariner, Ocean Vessels.
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- Carpenter, Zerle Leon, Assistant Professor of Animal Science. (1962) B.S., Oklahoma State, 1957; M.S., Wisconsin, 1960; Ph.D., 1962.
- Carr, Reed, Major, Associate Professor of Air Science. (1963, 1964) B.S., Texas A&M, 1950.
- Carter, Dildford Campbell, Assistant Professor of Wildlife Science. (1961, 1964) B.S., Southern Methodist, 1956; M.S., 1956; Ph.D., Texas A&M, 1962.
- Cartwright, Thomas Campbell, Professor of Animal Science. (1958) B.S., Clemson Agricultural College, 1948; M.S., Texas A&M, 1949; Ph.D., 1954.
- Casey, Albert J., Associate Professor of Psychology. (1962, 1965) B.A., Kansas, 1953; M.A., 1956; Ph.D., 1962.
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- Cherry, Richard Theodore, Associate Professor of Finance. (1962, 1965) B.A., Texas A&M, 1951; M.A., Texas, 1959; Ph.D., 1965.



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- Chin, Edwin, Associate Professor of Biology. (1965) B.S., Harvard College, 1948; M.S., New Hampshire, 1953; Ph.D., Washington, 1961.
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- Clark, Donald Raye, Assistant Professor of Veterinary Physiology and Pharmacology. (1963) B.S., Texas A&M, 1958; D.V.M., 1960.
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- Clayton, William Howard, Professor of Meteorology and of Oceanography. (1954, 1965) B.S., Bucknell, 1949; Ph.D., Texas A&M, 1956.
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- Doran, Edwin Beale, Jr., Associate Professor of Geography and Assistant Dean of College of Geosciences. (1960, 1965) B.A., Louisiana State, 1938; M.S., 1947; Ph.D., California at Berkeley, 1953.
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- Edmondson, Vance Ward, Associate Professor of Agricultural Economics. (1956, 1959) B.S., Arkansas, 1948; M.S., Oklahoma Agricultural and Mechanical College, 1950; Ph.D., Cornell, 1956.
- Eisner, Melvin, Professor of Physics, (1948, 1957) B.A., Brooklyn College, 1942; M.S., North Carolina, 1947; Ph.D., 1948.
- Ekfelt, Fred Emil, Professor of English. (1938, 1951) B.A., Iowa, 1931; M.A., 1932; Ph.D., 1941.
- Elkins, Rollin Lafayette, Associate Professor of Management. (1935, 1946) B.S., Texas A&M, 1933; M.S., 1935.
- Ellett, Edwin Willard, Associate Professor of Veterinary Medicine and Surgery. (1958, 1961) D.V.M., Georgia, 1953; B.S., Virginia Polytechnic Institute, 1954; M.S., Texas A&M, 1961.
- Elliott, James Marion, Assistant Professor of Education and Psychology. (1965) B.A., Abilene Christian College, 1959; M.A., Houston, 1963.
- Ellis, William C., Associate Professor of Animal Science. (1961, 1963) B.S., Louisiana Polytechnic Institute, 1953; M.S., Missouri, 1955; Ph.D., 1958.
- Elmqvist, Anne Marie, Assistant Professor of Modern Languages. (1965) B.A., Texas, 1942; M.A., 1961.
- Elmqvist, Karl Erik, Associate Professor of English. (1935, 1947) A.B., Southern Methodist, 1932; M.A., Texas, 1939.
- El-Sayed, Sayed Zakaria, Assistant Professor of Oceanography. (1961) B.S., Alexandria, 1949; M.S., 1951; Ph.D., Washington, 1959.
- Emon, Donald Edward, Assistant Professor of Nuclear Engineering. (1964) B.S., Washington, 1960; M.S., Florida, 1961; Ph.D., Rensselaer Polytechnic Institute, 1964.
- Engleman, E. Mark, Assistant Professor of Biology. (1965) B.S., Oklahoma, 1958; M.S., 1959; Ph.D., California, 1963.
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- Esten, Clarence Kenyon, Assistant Professor of English. (1946, 1951) A.B., Baylor, 1931; M.A., 1949; M.A., 1961.
- Eubank, Philip Toby, Associate Professor of Chemical Engineering. (1961, 1964) B.S., Rose Polytechnic Institute, 1958; Ph.D., Northwestern, 1961.
- Evers, Warren Dean, Assistant Professor of Veterinary Medicine and Surgery. (1962) D.V.M., Michigan State, 1945.
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- Franklin, Ted Eugene, Associate Professor of Veterinary Microbiology. (1963) D.V.M., Texas A&M, 1941; M.S., 1952.
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- Gammel, John Ledel, Professor of Physics. (1963) B.A., Texas, 1944; M.A., 1946; Ph.D., Cornell, 1950.
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- Gardner, Frederick Albert, Associate Professor of Poultry Science. (1959, 1963) B.S., Vermont, 1953; M.S., Texas A&M, 1955; Ph.D., Missouri, 1960.
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- Greeley, Ralph Gordon, Assistant Professor of Veterinary Anatomy. (1960, 1963) B.S., Missouri, 1953; D.V.M., 1953.
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- Guthrie, William Spurgeon, Associate Professor of Mechanical Engineering. (1942, 1950) B.S., Central State Teachers College, 1930; M.A., Oklahoma, 1935; Reg. Prof. Engr.
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- Harris, William Birch, Associate Professor of Chemical Engineering. (1956) B.S., Colorado, 1941; M.S., Texas A&M, 1960; Reg. Prof. Engr.
- Harris, William Donald, Professor of Chemical Engineering. (1935, 1949) B.S., Iowa State College, 1929; M.S., 1931; Ph.D., 1934; Reg. Prof. Engr.
- Harrison, Arthur L., Plant Pathologist of Texas Agricultural Experiment Station, Yoakum. (1937, 1947) B.S., Ontario Agricultural College, 1929; Ph.D., Cornell, 1935.
- Harry, Harold William, Assistant Professor of Biology. (1964) B.S., Louisiana State, 1941; M.S., 1942; Ph.D., Michigan, 1952.
- Harston, Clive Richards, Professor of Agricultural Economics. (1964) B.S., Wyoming, 1941; M.S., 1947; Ph.D., Washington State, 1951.
- Hartley, Herman Otto, Professor of Statistics and Director of the Graduate Institute of Statistics. (1963) Ph.D., Berlin, 1934; Ph.D., Cambridge, 1940; D.Sc., London, 1953.

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- Hauer, Louis Frederick, Associate Professor of English. (1937, 1961) B.A., Dubuque, 1931; M.A., Iowa, 1933.
- Haupt, Lewis McDowell, Jr., Professor of Electrical Engineering. (1930, 1948) B.S., Texas A&M, 1927; M.S., 1935; Reg. Prof. Engr.
- Hawkins, Leslie Virgle, Professor of Industrial Education. (1954, 1959) B.S., Panhandle Agricultural and Mechanical College, 1938; M.S., Oklahoma Agricultural and Mechanical College, 1946; D.Ed., Pennsylvania State, 1953.
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- Heatherly, Henry Edward, Instructor in Mathematics. (1963) B.S., Texas A&M, 1960; M.S., 1962.
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- Hedges, Richard Marion, Associate Professor of Chemistry. (1960, 1963) B.S., Southern Methodist, 1950; Ph.D., Iowa State, 1955.
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- Holcomb, Robert Marion, Professor of Civil Engineering. (1947) B.S., Arizona, 1936; M.S., Iowa State College, 1941; Ph.D., 1956; Reg. Prof. Engr.
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- Huff, John Wesley, Assistant Professor of Veterinary Microbiology. (1962) D.V.M., Texas A&M, 1958; B.S., 1962; M.S., 1962.
- Huggett, Milton Alfred, Assistant Professor of English. (1946, 1951) B.A., Rochester, 1929; B.D., Episcopal Theological School, 1933; M.A., Baylor, 1952.
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- Jones, Jerry Lynn, Assistant Professor of Chemistry. (1962) B.A., Oklahoma State, 1957; M.S., 1960; Ph.D., Arkansas, 1963.
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- Williams, Mack Lester, Instructor in Mathematics. (1955) B.S., North Texas State College, 1942; M.S., 1949.
- Williamson, Donald N., Major, Associate Professor of Air Science. (1962, 1965) B.S., United States Military Academy, 1952.
- Wingren, Roy Matthew, Professor of Mechanical Engineering. (1928, 1943) B.S., Texas A&M, 1927; M.S., 1934; Reg. Prof. Engr.



- Woodcock, David Geoffrey, Assistant Professor of Architecture. (1962, 1963) B.Arch., Manchester, 1960.
- Woodward, David Reid, Assistant Professor of History. (1965) B.A., Austin Peay State College, 1961; M.A., Georgia, 1963; Ph.D., 1965.
- Woodward, Rupert C., Acting Library Director. (1965) B.S., Peabody College, 1940; B.S. (L.S.), 1947; M.A., Louisiana State, 1961.
- Woolket, Joseph John, Professor of Modern Languages. (1925, 1945) A.B., Oberlin College, 1924; M.A., 1925.
- Wooten, Alvin Boyd, Professor of Agricultural Economics. (1960, 1965) B.A., Texas A&M, 1948; M.S., 1950; Ph.D., 1955.
- Worley, Willard Parker, Assistant Professor of Electrical Engineering, (1956, 1964) B.S., Texas A&M, 1947; Reg. Prof. Engr.
- Wortham, Albert William, Professor and Head of Department of Industrial Engineering. (1964, 1965) B.A., East Texas State College, 1947; M.S., Oklahoma State, 1949; Ph.D., 1954.
- Wright, Samuel Robert, Professor of Civil Engineering. (1923, 1946) B.S., Texas A&M, 1922; M.S., 1928; C.E., 1931; Ph.D., 1946; Reg. Prof. Engr.
- Wynn, John Thomas, Instructor in Marketing. (1965) B.B.A., Texas A&M, 1962; M.B.A., 1965.
- Wythe, Landon Douglas, Jr., Assistant Professor of Animal Science. (1957, 1959) B.S., Texas A&M, 1951; M.S., 1955.
- Young, Mark Francis, Assistant Professor of Veterinary Medicine and Surgery. (1960, 1962) B.S., Utah State, 1955; D.V.M., Iowa State, 1958; M.S., Texas A&M, 1964.
- Young, Paul A., Plant Pathologist of Texas Agricultural Experiment Station, Jacksonville. (1935) B.S., Wabash College, 1921; M.A., Illinois, 1923; Ph.D., 1925.
- Zabcik, Calvin Lee, Instructor in Industrial Education. (1964) B.S., Texas A&M, 1953; M.Ed., 1956.
- Zener, Clarence M., Dean of Science. (1965, 1966) A.B., Stanford, 1926; Ph.D., Harvard, 1929.
- Zingaro, Ralph Anthony, Professor of Chemistry. (1954, 1964) B.S., City College of New York, 1946; M.S., Kansas, 1949; Ph.D., 1950.
- Zinn, Bennie A., Director of the Department of Student Affairs. (1945, 1961) B.S., Texas A&M, 1926; M.S., 1928.
- Zipp, Charles W., Major, Associate Professor of Military Science. (1964) B.S., United States Military Academy, 1953.
- Zwolinski, Bruno John, Professor of Chemistry. (1961, 1965) B.S., Canisius, 1941; M.S., Purdue, 1943; M.A., Princeton, 1944; Ph.D., 1947.

## RETIRED FACULTY MEMBERS

- Adrianse, Guy Webb, Professor Emeritus of Horticulture. (1921, 1960)
- Bagley, John Brewer, Professor Emeritus of Cotton Marketing. (1905, 1947)
- Bass, James Horace, Professor Emeritus of History. (1940, 1961)
- Bebout, Harley, Associate Professor of Agricultural Economics. (1939, 1959)
- Berry, Raymond Orvil, Professor Emeritus of Animal Husbandry. (1931, 1960)
- Bonnen, Clarence Alfred, Professor of Agricultural Economics. (1937, 1948)
- Bossler, Robert Burns, Professor of Petroleum Engineering. (1956)

- Boughton, Ivan Bertrand, Professor of Veterinary Pathology. (1948, 1953)
- Brewer, Alexander Van, Professor Emeritus of Mechanical Engineering. (1922, 1957)
- Brisson, Fred Robert, Professor Emeritus of Horticulture. (1926, 1964)
- Cofer, David Brooks, Professor of English and Archivist Emeritus. (1910, 1957)
- Cover, Sylvia A., Professor, Home Economics Department, Texas Agricultural Experiment Station. (1933, 1949)
- Crawford, Charles William, Professor Emeritus of Mechanical Engineering. (1919, 1965)
- Darnell, Albert Laurie, Professor Emeritus of Dairy Science. (1914, 1957)
- Doak, Clifton Childress, Professor Emeritus of Biology. (1926, 1960)
- Downard, Richard Walter, Assistant Professor Emeritus of Mechanical Engineering. (1913, 1961)
- Dunn, Ralph Clark, Professor Emeritus of Veterinary Bacteriology and Hygiene. (1911, 1950)
- Fleming, David Winston, Associate Professor of Mechanical Engineering. (1927, 1945)
- Fudge, Joseph Franklin, Professor of Agronomy. (1929, 1949)
- Gabbard, Letcher P., Professor of Agricultural Economics. (1947)
- Gammon, Samuel Rhea, Professor Emeritus of History. (1925, 1957)
- Gibbons, Eldred Harris, Associate Professor of Microbiology. (1925, 1939)
- Godbey, Chauncey Barger, Professor Emeritus of Genetics and Statistics. (1926, 1961)
- Greer, Clayton Alvis, Associate Professor of English. (1938, 1949)
- Hale, Fred, Professor Emeritus of Animal Science. (1922, 1965)
- Harter, Edward Lin, Associate Professor Emeritus of Chemistry. (1921, 1959)
- Hedgcock, Ernest Duval, Professor of English. (1936, 1949)
- Hillman, John Rolfe, Assistant Professor Emeritus of Mathematics. (1938, 1965)
- Hughes, Martin Collins, Professor Emeritus of Electrical Engineering. (1923, 1962)
- Hunt, Robert Lee, Professor Emeritus of Agricultural Economics. (1927, 1961)
- Jaggi, Frederick Putnam, Jr., Professor of Veterinary Public Health. (1937, 1949)
- Jones, Beecher Calvin, Assistant Professor Emeritus of Chemistry. (1921, 1947)
- Jones, Fred Rufus, Professor of Agricultural Engineering. (1921, 1940)
- Kavanaugh, Milam Shelby, Associate Professor of Psychology. (1947, 1965)
- Kenagy, Herbert Glenn, Associate Professor of Business Administration. (1955, 1957)
- Key, Percy Clark, Associate Professor Emeritus of English. (1924, 1957)
- Knapp, Robert Andrew, Instructor in Mathematics. (1957)
- LaMotte, Charles, Professor Emeritus of Biology. (1930, 1964)
- Langford, Ernest, Professor Emeritus of Architecture. (1915, 1957)
- Lewis, Robert Donald, Director of the Texas Agricultural Experiment Station. (1946)
- Lindsay, James Donald, Professor Emeritus of Chemical Engineering. (1938, 1965)
- Little, Van Allen, Professor Emeritus of Entomology. (1923, 1964)
- Lynch, Shirley Alfred, Professor of Geology. (1946)

- Middleton, Errol Bathurst, Professor Emeritus of Chemistry. (1922, 1962)
- Miller, Horace Otis, Associate Professor of Journalism. (1947, 1948)
- Mogford, Joseph Sayers, Professor of Agronomy. (1925, 1937)
- Mullins, Benjamin Franklin Kelso, Professor of Engineering Graphics. (1921, 1954)
- Nelson, Thomas Robert, Associate Professor Emeritus of Mathematics. (1925, 1957)
- O'Bannon, Lester Severance, Professor of Mechanical Engineering. (1948)
- Porter, Walter Lee, Professor Emeritus of Mathematics. (1918, 1959)
- Potts, William McDaniel, Professor Emeritus of Chemistry. (1926, 1959)
- Powell, Francis Warren, Assistant Professor of English. (1937, 1944)
- Reeves, Robert Gatlin, Professor of Genetics. (1928, 1947)
- Reinhard, Henry J., Professor Emeritus of Entomology. (1947, 1960)
- Richey, John Jefferson, Professor Emeritus of Civil Engineering. (1912, 1959)
- Rode, Norman Frederick, Professor Emeritus of Electrical Engineering. (1922, 1962)
- Rogers, Bruce Allison, Professor of Mechanical Engineering. (1957)
- Ross, Henry, Professor of Agricultural Education. (1935)
- Rupel, Isaac Walker, Professor of Dairy Science. (1945)
- Russell, Daniel, Professor Emeritus of Sociology. (1926, 1964)
- Russell, William Low, Professor Emeritus of Geology. (1946, 1963)
- Sandstedt, Carl Edward, Professor Emeritus of Civil Engineering. (1923, 1959)
- Silvey, Oscar William, Professor Emeritus of Physics. (1916, 1951)
- Snuggs, Roland Edward, Associate Professor of Chemistry. (1924, 1946)
- Snyder, Roy Webster, Extension Meat Specialist. (1930)
- Stephenson, Henson Knowlen, Professor of Civil Engineering. (1945, 1957)
- Street, William Ezra, Professor of Engineering Graphics. (1941)
- Summey, George, Jr., Professor Emeritus of English. (1922, 1951)
- Trotter, Ide Peebles, Dean Emeritus of the Graduate School and Professor Emeritus of Agronomy. (1936, 1960)
- Vezey, Edward Earl, Professor Emeritus of Physics. (1920, 1961)
- Wapple, Albert Russell, Instructor in Mathematics. (1942)
- Ward, Robert Page, Professor Emeritus of Electrical Engineering. (1925, 1962)
- Weaver, Paul, Distinguished Professor of Geology and Geophysics. (1953)
- Wilcox, George Barton, Professor Emeritus of Education and Psychology. (1920, 1959)
- Winkler, Charles Herman, Professor Emeritus of Psychology. (1923, 1946)
- Young, Vernon Alphas, Professor of Range and Forestry. (1929, 1946)



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1965/66



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1965-66

FEBRUARY 1, 1965





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GENERAL CATALOGUE  
RECORD OF SESSION 1964-65  
ANNOUNCEMENTS FOR THE SESSION 1965-66



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COLLEGE STATION, TEXAS

# THE ACADEMIC CALENDAR FOR 1965-66

## SUMMER SESSION, 1965

June 7	Monday. Registration for the first term, 7 a.m. to 12 noon.
June 8	Tuesday. Beginning of classes, 7 a.m.
June 10	Thursday. Last day for enrolling in the University for the first term and for making changes in registration.
July 5	Monday. A holiday.
July 15	Thursday. Beginning of first term final examinations, 7 p.m.
July 16	Friday. Last day of first term final examinations.
July 19	Monday. Registration for second term, 7 a.m. to 12 noon.
July 20	Tuesday. Beginning of classes, 7 a.m.
July 22	Thursday. Last day for enrolling in the University for the second term and for making changes in registration.
August 26	Thursday. Beginning of second term final examinations, 7 p.m.
August 27	Friday. Last day of second term final examinations.

## REGULAR SESSION, 1965-66

September 15	Wednesday. New freshmen who participated in the summer conferences report to campus.
September 15-16	Wednesday and Thursday. New Student Program and registration.
September 16	Thursday. Registration of all other students, 1 p.m. to 5 p.m.
September 17	Friday. Continuation of registration of all other students, 8 a.m. to 5 p.m.
September 18-19	Saturday and Sunday. Organization of Cadet Corps.
September 20	Monday. Beginning of Fall Semester classes, 8 a.m.
September 25	Saturday. Last day for enrolling in the University for the Fall Semester or for adding new courses.
September 29	Wednesday. Last day in the Fall Semester for dropping courses with no grade.
November 15	Monday. Mid-semester grade reports.
November 25-29	Thursday-Sunday, inclusive. Thanksgiving holidays.
December 18	Saturday, noon. Beginning of Christmas recess.
January 3, 1966	Monday. End of Christmas recess.
January 22	Saturday. Commencement.
January 24-29	Monday-Saturday, inclusive. Semester examinations.
February 2	Wednesday. New freshmen report to campus for Spring Semester.
February 4	Friday. Registration for Spring Semester, 1 p.m. to 5 p.m.
February 5	Saturday. Continuation of registration for Spring Semester, 8 a.m. to 5 p.m.
February 7	Monday. Beginning of Spring Semester classes, 8 a.m.

February 12	Saturday. Last day for enrolling in the University for the Spring Semester or for adding new courses.
February 16	Wednesday. Last day in Spring Semester for dropping courses with no grade.
April 4	Monday. Mid-semester grade reports.
April 6	Wednesday. Beginning of Spring recess, 5 p.m.
April 12	Tuesday. End of Spring recess, 8 a.m.
May 28	Saturday. Commencement and Final Review.
May 30-June 4	Monday-Saturday, inclusive. Semester examinations.

## SUMMER SESSION, 1966

June 6	Monday. Registration for the first term, 7 a.m. to 12 noon.
June 7	Tuesday. Beginning of classes, 7 a.m.
June 9	Thursday. Last day for enrolling in the University for the first term and for making changes in registration.
July 4	Monday. A holiday.
July 14	Thursday. Beginning of first term final examinations, 7 p.m.
July 15	Friday. Last day of first term final examinations.
July 18	Monday. Registration for the second term, 7 a.m. to 12 noon.
July 19	Tuesday. Beginning of classes, 7 a.m.
July 21	Thursday. Last day for enrolling in the University for the second term and for making changes in registration.
August 25	Thursday. Beginning of second term final examinations, 7 p.m.
August 26	Friday. Last day of second term final examinations.

## COLLEGE OF VETERINARY MEDICINE

September 4	Saturday. Registration for first trimester, 8 a.m.
September 6	Monday. Beginning of classes for first trimester, 8 a.m.
November 25-28	Thursday-Sunday, inclusive, Thanksgiving holidays.
December 18	Saturday. End of first trimester and registration for second trimester, 8 a.m.
December 18	Saturday, noon. Beginning of Christmas recess.
January 3	Monday. End of Christmas recess and beginning of classes for second trimester, 8 a.m.
April 8-11	Friday-Monday, inclusive, Easter holidays.
April 16	Saturday. End of second trimester and registration for third trimester, 8 a.m.
April 17-24	Spring recess.
April 25	Monday. Beginning of classes for third trimester, 8 a.m.
July 2-5	Saturday-Tuesday, inclusive, Independence Day holiday.
August 6	Saturday, noon. End of third trimester.



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## FACULTY

(Correct as of February 1, 1965)

(Figures in parentheses indicate date of first appointment on the University Staff and date of appointment to present position respectively. The symbol "†" indicates full membership on the Graduate Faculty; the symbol "‡" indicates associate membership on the Graduate Faculty.)

- †Abbott, John Paul, Distinguished Professor of English. (1926, 1956) B.A., Vanderbilt, 1925; Ph.D., Iowa, 1939.
- Abdo, George Edgar, Instructor in Mathematics. (1964) B.A., Rice Institute, 1958; M.S., Texas A&M, 1961.
- Adams, Arthur Douglas, Professor of Health and Physical Education. (1939, 1949) B.S., Texas A&M, 1939; M.S., 1944.
- ‡Adkins, William G., Research Economist, Texas Transportation Institute. (1964) B.S., Texas A&M, 1951; M.S., 1953; Ph.D., 1963.
- †Adkisson, Perry Lee, Professor of Entomology. (1958, 1963) B.S., Arkansas, 1950; M.S., 1954; Ph.D., Kansas State College, 1956.
- Aldred, William Hughes, Assistant Professor of Agricultural Engineering. (1953, 1957) B.S., Georgia, 1951; M.S., Texas A&M, 1956.
- ‡Alexander, Robert Benjamin, Associate Professor of Chemistry. (1952, 1959) B.A., Baylor, 1945; M.A., 1946; Ph.D., Texas A&M 1957.
- Allen, Edwin Ernest, Instructor in Architecture. (1964) B.Arch., Texas A&M, 1954.
- ‡Alter, Alan Brian, Assistant Professor of Mechanical Engineering. (1949, 1952) B.S., Pittsburg, 1948; M.S., Texas A&M, 1953; Reg. Prof. Engr.
- Althaus, Marlin Clinton, Assistant Professor of Business Administration. (1963) B.S., Texas A&M, 1949; C.P.A., 1952; M.B.A., Texas, 1956.
- Ames, Robert Theodore, Jr., Instructor in Business Administration. (1961) B.B.A., Texas A&M, 1960; M.B.A., 1962.
- ‡Amin, Jagdish Vaghjibhai, Assistant Professor of Plant Sciences. (1963) B.S., Bombay, 1947; M.S., 1950; M.S., Michigan State College, 1953; Ph.D., Texas A&M, 1957.
- Amoss, Max St. Clair, Jr., Instructor in Veterinary Physiology and Pharmacology. (1964) B.S., Pennsylvania State, 1962.
- Anderson, Clifton Einar, Instructor in Government. (1962) B.S., Wisconsin, 1947; M.A., California, 1954.
- Anderson, Donald T., Captain, Assistant Professor of Air Science. (1962) B.B.A., Texas A&M, 1959.
- †Anderson, John Quincy, Professor of English and Head of Department. (1953, 1962) A.B., Oklahoma Agricultural and Mechanical College, 1939; M.A., Louisiana State, 1948; Ph.D., North Carolina, 1952.
- ‡Anderson, Warren Boyd, Assistant Professor of Soil and Crop Sciences. (1964) B.S., Brigham Young, 1958; M.S., Colorado State, 1962; Ph.D., 1964.
- Andrews, Paul Milton, Associate Professor of Health and Physical Education. (1943, 1951) B.S., Sul Ross State Teachers College, 1934; M.Ed., Texas A&M, 1945.
- †Angino, Ernest Edward, Assistant Professor of Oceanography. (1962) B.S., Lehigh, 1954; M.S., Kansas, 1958; Ph.D., 1961.
- †Applegate, Howard George, Associate Professor of Plant Physiology and Pathology. (1963) B.S., Colorado State, 1950; M.S., 1952; Ph.D., Michigan State, 1956.
- Archer, Stanley Louis, Instructor in English. (1962) B.A., Texas A&M, 1959; M.A., Mississippi, 1961.



- Armstrong, James Clyde, Assistant Professor of Civil Engineering. (1964) B.S., Texas A&M, 1955; B.S., 1961; M.S., 1962.
- ‡Ashcraft, Allan Coleman, Assistant Professor of History. (1956, 1960) B.A., Texas A&M, 1950; M.A., Columbia, 1951; Ph.D., 1960.
- †Ashworth, Lee J., Jr., Assistant Professor of Plant Physiology and Pathology. (1958) B.S., California, 1951; M.S., 1954; Ph.D., 1958.
- †Atkins, Irvin Milburn, Agronomist (Agricultural Research Service, USDA, cooperating) (1939, 1954) B.S., Kansas State College, 1928; M.S., 1936; Ph.D., Minnesota, 1945.
- †Atkinson, Robert Leon, Assistant Professor of Poultry Science. (1955) B.S., Texas A&M, 1949; M.S., 1950; Ph.D., California, 1958.
- Atwell, Buddy Houston, Instructor in Geophysics. (1962) B.S., Texas A&M, 1960.
- Bailey, Kenneth Ralph, Assistant Professor of Mathematics. (1946, 1954) B.A., Texas, 1937; M.A., 1941.
- Baker, Denzil Laval, Colonel, Commandant and Professor of Military Science. (1963) B.A., Texas A&M, 1933.
- †Baldauf, Richard John, Professor of Wildlife Science. (1952, 1964) B.S., Albright College, 1949; M.S., Texas A&M, 1951; Ph.D., 1956.
- ‡Ballinger, Richard Henry, Professor of English. (1954, 1957) B.A., Texas, 1936; M.A., 1936; Ph.D., Harvard, 1953.
- †Banks, William Carl, Professor of Veterinary Medicine and Surgery. (1941, 1955) D.V.M., Texas A&M, 1941; M.S., 1952.
- Bardell, North Bruce, Jr., Assistant Professor of Engineering Graphics. (1953, 1957) B.S., Texas A&M, 1953; M.Eng., 1962.
- †Barker, Donald Gene, Associate Professor of Education and Psychology. (1959, 1963) B.A., Baylor, 1952; M.A., 1954; Ph.D., Texas, 1961.
- ‡Barker, Palmer Winfield, Associate Professor of Physics. (1946, 1949) B.S., Missouri, 1932; M.A., 1933.
- ‡Barnard, Herbert Marvin, Associate Professor of Electrical Engineering. (1958, 1964) B.S., Texas A&M, 1955; M.S., 1960; Ph.D., Illinois, 1964.
- Barnes, Jack Allan, Instructor in Physics. (1962) B.A., McMurry College, 1960; M.S., Texas A&M, 1963.
- ‡Barzak, Robert William, Assistant Dean of Graduate Studies and Associate Professor of English. (1955, 1962) B.A., Texas A&M, 1949; M.A., Illinois, 1951; Ph.D., 1959.
- †Bashaw, Elexis C., Geneticist of Agricultural Research Service, USDA. (1951, 1955) B.S., Purdue, 1947; M.S., 1958; Ph.D., Texas A&M, 1954.
- Bassett, James Wilbur, Assistant Professor of Animal Science. (1963) B.S., Texas A&M, 1948; M.S., Montana State College, 1957.
- †Basye, Robert Eugene, Professor of Mathematics. (1940, 1952) B.A., Missouri, 1929; M.A., Princeton, 1931; Ph.D., Texas, 1933.
- †Baty, James Bernard, Professor of Civil Engineering. (1948, 1950) B.S., Texas A&M, 1925; M.C.E., Cornell, 1950; Reg. Prof. Engr.
- Bayliss, Garland Erastus, Assistant Professor of History. (1956, 1958) B.S., Arkansas 1951; M.A., Texas, 1953.
- ‡Bearden, Harold D., Director of Texas Engineering Extension Service. (1947, 1957) B.S., Texas Technological College, 1931; M.A., Texas, 1936.
- †Beasley, Joseph Noble, Professor of Veterinary Pathology. (1959, 1964) D.V.M., Texas A&M, 1949; M.S., 1956; Ph.D., Oklahoma, 1964.
- Beasley, William Louis, Instructor in Electrical Engineering. (1963) B.S., Texas A&M, 1943.

- Beckham, John Blair, Associate Professor of Chemistry. (1946, 1958) A.B., Daniel Baker College, 1936; B.S., 1937; M.S., Texas A&M, 1950.
- Beerwinkle, Kenneth, Jr., Instructor in Agricultural Engineering. (1963) B.S., Texas A&M, 1960.
- Bell, Jerry Don, Instructor in Veterinary Medicine and Surgery. (1965) B.S., Texas A&M, 1964; D.V.M., 1964.
- †Bell, Rurel Roger, Associate Professor of Veterinary Parasitology. (1952, 1958) D.V.M., Georgia, 1952; M.S., Texas A&M, 1955.
- Bell, Stephen, Assistant Professor of Physics. (1963) B.S., St. Andrews (Scotland), 1958; Ph.D., 1964.
- Bell, Wiley Wayne, Major, Associate Professor of Military Science. (1961, 1964) B.S., Oklahoma State, 1953; M.A., Texas A&M, 1964.
- †Bennett, Alvin Lowell, Associate Professor of English. (1954, 1957) B.A., Texas, 1927; M.A., Washington, 1931; Ph.D., Texas, 1952.
- †Benson, Fred Jacob, Dean of Engineering, Administrator of Texas Engineering Experiment Station, and Professor of Civil Engineering. (1937, 1962) B.S., Kansas State College, 1935; M.S., Texas A&M, 1936; Reg. Prof. Engr.
- †Benton, Wilbourn Eugene, Professor of Government. (1957, 1962) B.A., Texas Technological College, 1939; M.A., 1941; Ph.D., Texas, 1948.
- Berkley, William Earl, Instructor in Veterinary Medicine and Surgery. (1964) B.S., Texas A&M, 1961; D.V.M., 1963.
- Berryman, Jesse A., Chief Yeoman, Instructor in Naval Science, Texas Maritime Academy. (1963)
- Bertrand, Clint Albert, Assistant Professor of Industrial Education. (1953, 1959) B.S., Texas A&M, 1953; M.S., 1959; D.Ed., 1964.
- †Bird, Luther Smith, Associate Professor of Plant Physiology and Pathology. (1951, 1959) B.S., Clemson College, 1948; M.S., Texas A&M, 1953; Ph.D., 1955.
- †Bishop, Vernon Spilman, Assistant Professor of Nuclear Engineering. (1964) B.S., Mississippi College, 1958; M.S., Kansas, 1960; Ph.D., Mississippi Medical Center, 1964.
- Bitner, Claude Andrell, Jr., Assistant Professor of Economics. (1959) B.B.A., Texas, 1950; M.A., 1956.
- †Blackhurst, Homer T., Professor of Horticulture. (1947, 1950) A.B., Glenville State Teachers College, 1935; M.S., Texas A&M, 1940; Ph.D., 1947.
- †Blank, Horace R., Professor of Geology. (1949, 1953) B.S., Pennsylvania, 1919; Ph.D., 1924.
- †Bloodworth, Morris Elkins, Professor of Soil Physics and Head of Department of Soil and Crop Sciences. (1956, 1963) B.S., Texas A&M, 1941; M.S., 1953; Ph.D., 1958.
- Boehme, Hollis Clyde, Instructor in Physics. (1962) B.A., Texas A&M, 1960; M.S., 1961.
- Bolte, David Endicott, Major, Associate Professor of Military Science. (1962) B.S., United States Military Academy, 1949.
- †Bonsma, Jan C., Professor of Animal Science. (1964) B.S., Pretoria, 1931; M.S., 1935.
- †Boone, James Leroy, Jr., Assistant Professor of Industrial Education. (1952, 1955) B.S., Texas A&M, 1947; M.Ed., 1948.
- Boone, Robert Leroy, Assistant Professor of Humanities. (1960, 1961) B.S., Houston, 1951; M.A., Sam Houston State Teachers College, 1954.
- Boriskie, Ben Bernard, Associate Professor of Physics. (1941, 1959) B.S., Texas A&M, 1936, M.S., 1948.

- Boswell, James Louis, Instructor in Biology. (1961) B.S., East Central State (Oklahoma), 1936; M.S., Oklahoma, 1938.
- Botner, Stanley Benton, Assistant Professor of Government. (1963) A.B., Missouri, 1947; M.A., 1960; Ph.D., 1963.
- Bowen, James Allen, Instructor in Veterinary Medicine and Surgery. (1964) B.S., Texas A&M, 1959; D.V.M. 1963.
- Bowers, David R., Associate Professor of Journalism. (1964) B.J., Missouri, 1946; A.M., 1947; Ph.D., Iowa, 1954.
- Boyd, Charles Leroy, Assistant Professor of Veterinary Medicine and Surgery. (1964) D.V.M., Texas A&M, 1945.
- Bradley, John W., Assistant Professor of Poultry Science. (1963) B.S., Arkansas, 1950; M.S., 1954.
- †Branson, Robert Earl, Professor of Agricultural Economics and Sociology. (1955, 1958) B.S., Southern Methodist, 1941; M.P.A., Harvard, 1948; M.A., 1949; Ph.D., 1954.
- Breitenkamp, Edward Carlton, Professor of Modern Languages. (1953, 1963) B.A., Drake, 1936; M.A., 1938; Ph.D., Iowa, 1951.
- ‡Breuer, Leslie H., Assistant Professor of Animal Science. (1964) B.S., Missouri, 1960; M.S., 1962; Ph.D., Cornell, 1964.
- †Brewer, Burns W., Professor of Mathematics. (1938, 1957) A.B., Missouri, 1935; A.M., 1936; Ph.D., 1938.
- †Bridges, Charles Hubert, Professor of Veterinary Pathology and Head of Department. (1955, 1960) D.V.M., Texas A&M, 1945; M.S., 1954; Ph.D., 1957.
- Bridges, Gilbert Sadler, Assistant Professor of Economics. (1963) B.B.A., Texas A&M, 1958; M.S., 1960.
- ‡Brigham, Raymond D., Agronomist. (1957) B.S., Texas Technological College, 1950; M.S., Iowa State, 1952; Ph.D., 1957.
- †Brown, Murray Allison, Associate Professor of Dairy Science. (1955, 1962) B.S., Michigan State College, 1950; M.S., Texas A&M, 1953; Ph.D., 1956.
- †Brown, Meta Suche, Professor of Agronomy. (1940, 1955) B.A., Texas, 1931; M.A., 1933; Ph.D., 1935.
- Brown, Stewart Ellsworth, Instructor in Mechanical Engineering and Pattern Maker Specialist. (1951, 1963)
- †Brown, Sidney Overton, Professor of Biology. (1936, 1949) B.A., Texas, 1932; Ph.D., 1936.
- ‡Brundidge, Kenneth Cloud, Associate Professor of Meteorology. (1955, 1962) B.A., Chicago, 1952; M.S., 1953; Ph.D., Texas A&M, 1961.
- Bryant, Charles Franklin, Jr., Chief Gunners Mate (Missiles), Instructor in Naval Science, Texas Maritime Academy. (1963)
- Bryant, Jack Douglas, Assistant Professor of Mathematics. (1964) B.A., Texas A&M, 1959; M.S., 1962.
- Bryant, William Richards, Assistant Professor of Oceanography. (1963) M.S., Chicago, 1961.
- †Buchanan, Spencer Jennings, Professor of Civil Engineering. (1946) B.S., Texas A&M, 1926; M.S., Massachusetts Institute of Technology, 1931; C.E., Texas A&M, 1948; Reg. Prof. Engr.
- ‡Bull, Don Lee, Entomologist, Entomology Research Division, ARS, USDA. (1963) B.S., Texas A&M, 1953; M.S., 1960; Ph.D., 1962.
- Bullard, Tommy Loran, Instructor in Veterinary Pathology. (1964) B.S., Texas A&M, 1961; D.V.M., 1964.



- †Burgess, Archie Rostron, Professor of Industrial Engineering and Head of Department. (1948, 1951) B.S., Washington, 1932; M.S., 1938; Reg. Prof. Engr.
- ‡Burgess, Leonard Randolph, Associate Professor of Business Administration. (1964) B.A., Brown, 1942; M.B.A., Harvard, 1947; Ph.D., Columbia, 1961.
- †Burke, Horace Reagan, Assistant Professor of Entomology. (1958) B.S., Sam Houston State Teachers College, 1953; M.S., Texas A&M, 1955; Ph.D., 1959.
- Burkes, Tommy Royce, Instructor in Electrical Engineering. (1963) B.S., Texas Technological College, 1961; M.S., 1963.
- ‡Burnett, Earl, Research Soil Scientist, Department of Soil and Crop Sciences. (1964) B.S., Texas Technological College, 1948; M.S., 1949; Ph.D., Ohio State, 1952.
- †Burns, Edward Eugene, Associate Professor of Horticulture. (1956, 1959) B.S., Purdue, 1950; M.S., 1952; Ph.D. 1956.
- †Burns, Patton Wright, Professor of Veterinary Physiology and Pharmacology and Head of Department. (1926, 1935) B.S., Texas A&M, 1923; D.V.M., 1926.
- Butler, Marvin Harold, Assistant Professor of Economics. (1948) A.B., McKendree College, 1940; M.A., Illinois, 1948.
- †Butler, Ogbourne Duke, Jr., Professor of Animal Science and Head of Department. (1947, 1956) B.S., Texas A&M, 1939; M.S., 1947; Ph.D., Michigan State College, 1953.
- ‡Caddess, James Harvey, Associate Professor of Mechanical Engineering. (1940, 1953) B.S., Texas A&M, 1932; M.S., 1934; Reg. Prof. Engr.
- †Calaway, Paul Kenneth, Professor of Chemistry. (1957) B.A., Arkansas College, 1931; M.S., Georgia Institute of Technology, 1933; Ph.D., Texas, 1938.
- Caleb, Phillip I., Jr., Captain, Assistant Professor of Air Science. (1964) B.A., Arkansas, 1953.
- †Calhoun, John C., Jr., Vice Chancellor for Programs and Professor of Petroleum Engineering. (1955, 1963) B.S., Pennsylvania State College, 1937; M.S., 1941; Ph.D., 1946; Reg. Prof. Engr.
- †Calliham, Melvin Ray, Professor of Veterinary Medicine and Surgery and Head of Department. (1958) B.S., Texas A&M, 1941; D.V.M., 1949.
- †Camp, Bennie Joe, Associate Professor of Biochemistry and Nutrition. (1956, 1960) B.S., East Texas State Teachers College, 1949; M.S., Texas A&M, 1953; Ph.D., 1956.
- Cannon, Dennis P., Lieutenant, Instructor in Marine Transportation, Texas Maritime Academy. (1963) B.S., United State Merchant Marine Academy, 1953; Licensed Master Mariner, Ocean Vessels.
- Cantrell, Wallace Gene, Instructor in Physics. (1959) B.S., Texas A&M, 1958.
- Carmichael, Horace Hart, Captain, Assistant Professor of Military Science. (1962) A.B., George Washington, 1959.
- †Carpenter, Zerle Leon, Assistant Professor of Animal Science. (1962) B.S., Oklahoma State, 1957; M.S., Wisconsin, 1960; Ph.D., 1962.
- Carr, Reed, Major, Associate Professor of Air Science. (1963, 1964) B.S., Texas A&M, 1950.
- †Carter, Dilford Campbell, Assistant Professor of Wildlife Science. (1961, 1964) B.S., Southern Methodist, 1956; M.S., 1956; Ph.D., Texas A&M, 1962.
- †Cartwright, Thomas Campbell, Professor of Animal Science. (1958) B.S., Clemson Agricultural College, 1948; M.S., Texas A&M, 1949; Ph.D., 1954.
- Casey, Albert J., Assistant Professor of Psychology. (1962) B.A., Kansas, 1953; M.A., 1956; Ph.D., 1962.
- Cashion, Mason Lee, Instructor in Business Administration. (1964) B.B.A., Texas A&M, 1953.

- †Chalk, Alfred Franklin, Professor of Economics and Head of Department. (1936, 1956) B.A., Baylor, 1934; M.S., Texas A&M, 1936; Ph.D., Texas, 1950.
- Chambers, William Gough, Lecturer in Mathematics. (1964) B.A., Trinity College, Cambridge (England), 1959; Ph.D., 1963.
- Cherry, Richard Theodore, Assistant Professor of Business Administration. (1962) B.A., Texas A&M, 1951; M.A., Texas, 1959.
- Cherry, Thomas Dunnam, Director of Business Affairs. (1962) B.S., Sam Houston State Teachers College, 1932; M.S., Texas A&M, 1938.
- Clampitt, Ralph, Assistant Professor of Architecture. (1963) B.Arch., Tulane, 1960.
- Clark, Donald Raye, Assistant Professor of Veterinary Physiology and Pharmacology. (1963) B.S., Texas A&M, 1958; D.V.M., 1960.
- Clark, Lewis Edwin, Instructor in Agronomy. (1962) B.S., Texas Technological College, 1959; M.S., Texas A&M, 1961.
- †Clark, Robert Alfred, Assistant Professor of Meteorology. (1960, 1961) B.S., Kansas State, 1948; M.S., Texas A&M, 1959; Ph.D., 1964.
- †Clark, William Jesse, Assistant Professor of Biology. (1957) B.S., Utah State Agricultural College, 1950; M.S., 1956; Ph.D., 1958.
- †Clayton, William Howard, Associate Professor of Oceanography. (1954, 1961) B.S., Bucknell, 1949; Ph.D., Texas A&M, 1956.
- ‡Cleland, Samuel Miles, Professor of Engineering Graphics. (1941, 1958) B.A., West Texas State Teachers College, 1931; M.Ed., Texas A&M, 1940.
- Cobb, Lalovee Glenn, Instructor in Meteorology. (1962) B.A., Louisiana State, 1954; M.S., Texas A&M, 1963.
- †Cochran, Robert Glenn, Professor of Nuclear Engineering and Head of Department. (1959) A.B., Indiana, 1948; M.S., 1950; Ph.D., Pennsylvania State, 1957.
- ‡Cochrane, John Douglas, Associate Professor of Oceanography. (1956, 1962) B.A., California at Los Angeles, 1943; M.S., Scripps Institute of Oceanography, 1948.
- †Collier, Jesse Wilton, Associate Agronomist. (1949, 1960) B.S., Texas A&M, 1938; M.S., 1952; Ph.D., Rutgers, 1957.
- Comfort, Thomas Edwin, Associate Professor of Modern Languages. (1954, 1957) A.B., Northwestern, 1943; A.M., Illinois, 1951; Ph.D., 1954.
- †Conway, Dwight Colbur, Associate Professor of Chemistry. (1963) B.S., California at Berkeley, 1952; Ph.D., Chicago, 1956.
- ‡Cook, Benjamin Davy, Associate Professor of Agricultural Education and Specialist in Extension Training. (1950, 1960) B.S., Texas A&M, 1934; M.Ed., 1950; Ph.D., Wisconsin, 1957.
- ‡Cook, Elton D., Agronomist of Texas Agricultural Experiment Substation, Temple. (1949, 1952) B.S., Texas Technological College, 1935; M.S., Kansas State, 1948; Ph.D., Nebraska, 1951.
- †Coon, Jesse Bryan, Professor of Physics. (1946, 1957) A.B., Indiana, 1932; M.A., 1935; Ph.D., Chicago, 1949.
- ‡Cooper, Brian Seymour, Assistant Professor of Oceanography and Meteorology. (1963) B.S., Nottingham (England), 1956; Ph.D., 1959.
- ‡Cooper, Rodney Jean, Associate Professor of Animal Science. (1963) B.S., Oklahoma State, 1954; M.S., Iowa State, 1957; Ph.D., 1958.
- †Couch, James Russell, Professor of Biochemistry and Nutrition and of Poultry Science. (1948, 1949) B.S., Texas A&M, 1931; M.S., 1934; Ph.D., Wisconsin, 1948.
- Council, Clarence David, Instructor in Industrial Engineering. (1963) B.S., Texas A&M, 1961.

- ‡CoVan, Jack Phillip, Professor of Industrial Engineering. (1946, 1956) B.M.E., Ohio State, 1935; B.I.E., 1935; M.S., Illinois, 1942; Reg. Prof. Engr.
- Cowan, A. Leslie, Lecturer, Texas Maritime Academy. (1964) B.S., Bradley, 1954.
- Cox, Sidney Saunders, Assistant Professor of English. (1948, 1952) B.A., Southwest Texas State Teachers College, 1932; M.A., 1939.
- Craft, Clyde O'Brien, Instructor in Industrial Education. (1964) B.S., Eastern Kentucky State College, 1959; M.A., 1961.
- Crawford, Charles William, Professor of Mechanical Engineering. (1919, 1928) B.S., Texas A&M, 1919; M.S., 1929; Reg. Prof. Engr.
- †Crawford, Paul B., Assistant Director of Texas Petroleum Research Committee and Professor of Petroleum Engineering. (1952, 1962) B.S., Texas Technological College, 1943; M.S., Texas, 1946; Ph.D., 1949.
- †Creger, Clarence R., Assistant Professor of Poultry Science. (1962) B.S., Kansas State, 1955; M.S., 1956; Ph.D., Texas A&M, 1961.
- Creswell, Horace Staley, Assistant Professor of English. (1946, 1951) B.S., Texas Technological College, 1935; M.A., Texas Christian, 1938.
- Crittenden, Elmer Pratt, Assistant Professor of English. (1956) B.A., Boston, 1939; M.A., Southern Methodist, 1946.
- †Cronk, Alfred Edward, Professor of Aerospace Engineering and Head of Department. (1956) B.S., College of St. Thomas, 1937; M.S., Minnesota, 1946; Reg. Prof. Engr.
- †Crookshank, Herman Robert, Animal Nutritionist for Department of Biochemistry and Nutrition, USDA. (1959) B.S., Northeast Missouri State College, 1938; M.S., State University of Iowa, 1940; Ph.D., 1942.
- Cunningham, Norman Lynn, Instructor in Animal Science. (1963) B.S., Texas Technological College, 1962.
- Dabbs, Jack Autrey, Professor of Modern Languages and Head of Department. (1950, 1964) B.A., Texas, 1935; M.A., 1936; Ph.D., 1950.
- ‡Dahlberg, Frank Iver, Professor of Animal Science. (1936, 1947) B.S., Texas A&M, 1925; M.S., Wisconsin, 1930.
- Dahm, Ralph Albert, Associate Professor of Marine Engineering, Texas Maritime Academy. (1964) B.S., United States Merchant Marine Academy, 1957; M.A., Colgate, 1964; Licensed Second Assistant Engineer, Steam Vessels.
- †Danti, Alfred, Associate Professor of Chemistry. (1961) B.S., Colorado College, 1954; Ph.D., Massachusetts Institute of Technology, 1958.
- ‡Daron, Harlow H., Assistant Professor of Biochemistry and Nutrition. (1963) B.S., Oklahoma, 1956; Ph.D., Illinois, 1961.
- Darroch, James George, Assistant Professor of Statistics. (1964) B.S., Alberta (Canada), 1939; M.S., 1943.
- ‡Davis, Daniel Rowland, Associate Professor of Sociology. (1935, 1947) B.S., Texas A&M, 1932; M.S., 1935.
- †Davis, Richard Bratton, Associate Professor of Wildlife Science. (1951, 1959) B.S., Texas College of Arts and Industries, 1940; M.S., Texas A&M, 1949; Ph.D., 1952.
- ‡Davis, Richard Harvey, Jr., Professor of Veterinary Physiology and Pharmacology. (1951, 1964) D.V.M., Texas A&M, 1941; M.S., 1956.
- †Davis, William B., Professor of Wildlife Science and Head of Department. (1937, 1946) B.A., Chico State Teachers College, 1933; M.A., California, 1936; Ph.D., 1937.
- †Davis, William Burson, Assistant Professor of Civil Engineering. (1964) B.S., Colorado, 1952; S.M., Massachusetts Institute of Technology, 1958; S.E., 1959.
- †Davison, Richard Read, Assistant Professor of Chemical Engineering. (1958, 1961) B.S., Texas Technological College, 1949; M.S., Texas A&M, 1958; Ph.D., 1962; Reg. Prof. Engr.



- ‡Dayhoff, Eldred Eugene, Assistant Professor of Statistics. (1963) B.S., Texas A&M, 1955; M.S., 1956; Ph.D., Iowa State, 1964.
- ‡Denison, John Scott, Associate Professor of Electrical Engineering. (1949, 1954) B.S., New Mexico Agricultural and Mechanical College, 1948; M.S., Texas A&M, 1949; Reg. Prof. Engr.
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- Ward, Randall Walter, Lieutenant, Associate Professor of Naval Science and Head of Department, Texas Maritime Academy. (1963, 1964) B.A., Illinois, 1959.
- †Watkins, Gustav McKee, Director of Agricultural Instruction and Professor of Plant Physiology and Pathology. (1949, 1960) B.A., Texas, 1929; M.S., 1930; Ph.D., Columbia, 1935.
- †Wattleworth, Joseph A., Assistant Professor of Civil Engineering. (1964) B.S., Dartmouth College, 1959; M.S., 1960; M.S., Northwestern, 1961; Ph.D., 1963.
- †Weaver, James Nevin, Associate Professor of Entomology. (1951, 1957) B.A., Southwestern, 1941; M.S., Texas A&M, 1943; Ph.D., 1953.
- †Webb, Bill Dean, Research Chemist, Agricultural Research Service, USDA, TAES, Sub-Station No. 4, Beaumont, Texas. (1963) B.S., Texas A&M, 1956; M.S., 1959; Ph.D., 1961.
- †Webb, Earl Sherman, Associate Professor of Agricultural Education. (1961) B.S., Missouri, 1949; M.Ed., 1955; D.Ed., 1959.
- †Weekes, Donald Fessenden, Professor of Physics. (1937, 1945) B.S., Middlebury College, 1924; M.A., Amherst College, 1926; Ph.D., Cornell, 1937.
- †Wehrly, James S., Assistant Economist, Department of Agricultural Economics and Sociology. (1964) B.S., Illinois, 1949; M.S., 1951; Ph.D., Purdue, 1964.
- Weiner, Peter Douglas, Assistant Professor of Mechanical Engineering. (1956, 1959) B.S., Texas A&M, 1954; M.S., 1961; Reg. Prof. Engr.
- Welsch, Delane Emil, Assistant Professor of Agricultural Economics and Sociology. (1964) B.S., Nebraska, 1959; M.S., 1962.
- †Weseli, Donald F., Associate Professor of Animal Science. (1964) B.S., Ohio State, 1953; M.S., 1954; Ph.D., 1958.
- Whatley, Merle Michael Ray, Instructor in Electrical Engineering. (1964) B.S., Texas Technological College, 1962; M.S., 1964.



- †Whealy, Roger Dale, Professor of Chemistry. (1958) B.S., Eastern Normal, South Dakota, 1930; M.S., Colorado, 1937; M.S., Oregon, 1948; Ph.D., Colorado, 1953.
- †White, Robert Frederick, Professor of Architecture. (1947, 1954) B.S., Pennsylvania State College, 1934; M.Land., Michigan, 1951.
- ‡White, Thomas Gailand, Assistant Professor of Soil and Crop Sciences. (1964) B.S., New Mexico State, 1954; M.S., Texas A&M, 1958; Ph.D., 1962.
- †Whitehouse, Ulysses Grant, Director, Electron Microscope Laboratory and Associate Professor of Biochemistry and Nutrition. (1953, 1961) B.S., Kentucky, 1940; M.S., 1941; M.S., Iowa, 1942; Ph.D., Texas A&M, 1955.
- ‡Whiteley, Eli Lamar, Associate Professor of Agronomy. (1946, 1959) B.S., Texas A&M, 1941; M.S., North Carolina State, 1949; Ph.D., Texas A&M, 1959.
- †Whiting, Robert Louis, Professor of Petroleum Engineering and Head of Department. (1946, 1954) B.S., Texas, 1939; M.S., 1943; Reg. Prof. Engr.
- Wieder, Russell Karl, Assistant Professor of Health and Physical Education. (1956, 1960) B.A., Kenyon College, 1942.
- Wiening, Victor, Assistant Professor of English. (1952, 1956) B.A., Valparaiso, 1947; M.A., Louisiana State, 1949.
- Wiff, Donald Ray, Instructor in Physics. (1960) B.S., Capital, 1958; M.A., Kent State, 1960.
- Wilhoit, Randolph C., Associate Professor of Chemistry. (1964) B.A., Trinity, 1947; M.A., Kansas, 1949; Ph.D., Northwestern, 1952.
- ‡Wilkes, Lambert Henry, Associate Professor of Agricultural Engineering. (1957) B.S., Clemson Agricultural and Mechanical College, 1948; M.S., Texas A&M, 1953.
- Wilkinson, Richard, Lieutenant (jg), U.S.N., Instructor in Naval Science, Texas Maritime Academy. (1964) B.S., United States Naval Academy, 1963.
- Williams, Mack Lester, Instructor in Mathematics. (1955) B.S., North Texas State College, 1942; M.S., 1949.
- Williamson, Donald N., Captain, Assistant Professor of Air Science. (1962) B.S., United States Military Academy, 1952.
- †Wingren, Roy Matthew, Professor of Mechanical Engineering. (1928, 1943) B.S., Texas A&M, 1927; M.S., 1934; Reg. Prof. Engr.
- Woodcock, David Geoffrey, Assistant Professor of Architecture. (1962, 1963) B.Arch., Manchester, 1960.
- ‡Woolket, Joseph John, Professor of Modern Languages. (1925, 1945) A.B., Oberlin College, 1924; M.A., 1925.
- †Wooten, Alvin Boyd, Associate Professor of Agricultural Economics. (1960) B.A., Texas A&M, 1948; M.S., 1950; Ph.D., 1955.
- Worley, Willard Parker, Assistant Professor in Electrical Engineering. (1956, 1964) B.S., Texas A&M, 1947; Reg. Prof. Engr.
- †Wortham, Albert William, Associate Professor of Statistics and of Industrial Engineering. (1964) B.A., East Texas State College, 1947; M.S., Oklahoma State, 1949; Ph.D., 1954.
- †Wright, Samuel Robert, Professor of Civil Engineering. (1923, 1946) B.S., Texas A&M, 1922; M.S., 1928; C.E., 1931; Ph.D., 1946; Reg. Prof. Engr.
- Wythe, Landon Douglas, Jr., Assistant Professor of Animal Sciences. (1957, 1959) B.S., Texas A&M, 1951; M.S., 1955.
- Young, Mark Francis, Assistant Professor of Veterinary Medicine and Surgery. (1960, 1962) B.S., Utah State, 1955; D.V.M., Iowa State, 1958; M.S., Texas A&M, 1964.
- †Young, Paul A., Plant Pathologist of Texas Agricultural Experiment Station, Jacksonville. (1935) B.S., Wabash College, 1921; M.A., Illinois, 1923; Ph.D., 1925.

- Zabeik, Calvin Lee, Instructor in Industrial Education. (1964) B.S., Texas A&M, 1953; M.Ed., 1956.
- Zeitoun, Mohamed Ali, Assistant Professor of Oceanography and Meteorology. (1963) B.S., Cairo, 1950; M.S., Texas A&M, 1955; Ph.D., 1958.
- †Zingaro, Ralph Anthony, Professor of Chemistry. (1954, 1964) B.S., City College of New York, 1946; M.S., Kansas, 1949; Ph.D., 1950.
- Zinn, Bennie A., Director of the Department of Student Affairs. (1945, 1961) B.S., Texas A&M, 1926; M.S., 1928.
- Zipp, Charles W., Major, Associate Professor of Military Science. (1964) B.S., United States Military Academy, 1953.
- †Zwolinski, Bruno John, Professor of Chemistry and Head of Department. (1961, 1964) B.S., Canisius, 1941; M.S., Purdue, 1943; M.A., Princeton, 1944; Ph.D., 1947.

## RETIRED FACULTY MEMBERS

- Adriance, Guy Webb, Professor Emeritus of Horticulture. (1921, 1960)
- Bagley, John Brewer, Professor Emeritus of Cotton Marketing. (1905, 1947)
- Bass, James Horace, Professor Emeritus of History. (1940, 1961)
- Bebout, Harley, Associate Professor of Agricultural Economics. (1939, 1959)
- Berry, Raymond Orvil, Professor Emeritus of Animal Husbandry. (1931, 1960)
- Bonnen, Clarence Alfred, Professor of Agricultural Economics. (1937, 1948)
- Bossler, Robert Burns, Professor of Petroleum Engineering. (1956)
- Boughton, Ivan Bertrand, Professor of Veterinary Pathology. (1948, 1953)
- Brewer, Alexander Van, Professor Emeritus of Mechanical Engineering. (1922, 1957)
- Brisson, Fred Robert, Professor Emeritus of Horticulture. (1926, 1964)
- Cofer, David Brooks, Professor of English and Archivist Emeritus. (1910, 1957)
- Cover, Sylvia A., Professor, Home Economics Department, Texas Agricultural Experiment Station. (1933, 1949)
- Darnell, Albert Laurie, Professor Emeritus of Dairy Science. (1914, 1957)
- Dillingham, Harley Clay, Professor of Electrical Engineering. (1922, 1930)
- Doak, Clifton Childress, Professor Emeritus of Biology. (1926, 1960)
- Downard, Richard Walter, Assistant Professor Emeritus of Mechanical Engineering. (1913, 1961)
- Dunn, Ralph Clark, Professor Emeritus of Veterinary Bacteriology and Hygiene. (1911, 1950)
- Fleming, David Winston, Associate Professor of Mechanical Engineering. (1927, 1945)
- Fudge, Joseph Franklin, Professor of Agronomy. (1929, 1949)
- Gabbard, Letcher P., Professor of Agricultural Economics. (1947)
- Gammon, Samuel Rhea, Professor Emeritus of History. (1925, 1957)
- Gibbons, Eldred Harris, Associate Professor of Microbiology. (1925, 1939)
- Godbey, Chauncey Barger, Professor Emeritus of Genetics and Statistics. (1926, 1961)
- Greer, Clayton Alvis, Associate Professor of English. (1938, 1949)
- Harter, Edward Lin, Associate Professor Emeritus of Chemistry. (1921, 1959)
- Hedgcock, Ernest Duval, Professor of English. (1936, 1949)

- Hillman, John Rolfe, Assistant Professor Emeritus of Mathematics. (1938, 1965)
- Hughes, Martin Collins, Professor Emeritus of Electrical Engineering. (1923, 1962)
- Hunt, Robert Lee, Professor Emeritus of Agricultural Economics. (1927, 1961)
- Jones, Beecher Calvin, Assistant Professor Emeritus of Chemistry. (1921, 1947)
- Jones, Fred Rufus, Professor of Agricultural Engineering. (1921, 1940)
- Kenagy, Herbert Glenn, Associate Professor of Business Administration. (1955, 1957)
- Key, Percy Clark, Associate Professor Emeritus of English. (1924, 1957)
- Knapp, Robert Andrew, Instructor in Mathematics. (1957)
- LaMotte, Charles, Professor Emeritus of Biology. (1930, 1964)
- Langford, Ernest, Professor Emeritus of Architecture. (1915, 1957)
- Lewis, Robert Donald, Director of the Texas Agricultural Experiment Station. (1946)
- Little, Van Allen, Professor Emeritus of Entomology. (1923, 1964)
- Lynch, Shirley Alfred, Professor of Geology. (1946)
- Middleton, Errol Bathurst, Professor Emeritus of Chemistry. (1922, 1962)
- Miller, Horace Otis, Associate Professor of Journalism. (1947, 1948)
- Mogford, Joseph Sayers, Professor of Agronomy. (1925, 1937)
- Mullins, Benjamin Franklin Kelso, Professor Engineering Graphics. (1921, 1954)
- Nelson, Thomas Robert, Associate Professor Emeritus of Mathematics. (1925, 1957)
- O'Bannon, Lester Severance, Professor of Mechanical Engineering. (1948)
- Porter, Walter Lee, Professor Emeritus of Mathematics. (1918, 1959)
- Potts, William McDaniel, Professor Emeritus of Chemistry. (1926, 1959)
- Powell, Francis Warren, Assistant Professor of English. (1937, 1944)
- Reeves, Robert Gatlin, Professor of Genetics. (1928, 1947)
- Reinhard, Henry J., Professor Emeritus of Entomology. (1947, 1960)
- Richey, John Jefferson, Professor Emeritus of Civil Engineering. (1912, 1959)
- Rode, Norman Frederick, Professor Emeritus of Electrical Engineering. (1922, 1962)
- Rogers, Bruce Allison, Professor of Mechanical Engineering. (1957)
- Russell, Daniel, Professor Emeritus of Sociology. (1926, 1964)
- Russell, William Low, Professor Emeritus of Geology. (1946, 1963)
- Sandstedt, Carl Edward, Professor Emeritus of Civil Engineering. (1923, 1959)
- Silvey, Oscar William, Professor Emeritus of Physics. (1916, 1951)
- Smith, Hilton Atmore, Professor of Veterinary Pathology. (1949)
- Snuggs, Roland Edward, Associate Professor of Chemistry. (1924, 1946)
- Snyder, Roy Webster, Extension Meat Specialist. (1930)
- Stephenson, Henson Knowlen, Professor of Civil Engineering. (1945, 1957)
- Summey, George, Jr., Professor Emeritus of English. (1922, 1951)
- Trotter, Ide Peebles, Dean Emeritus of the Graduate School and Professor Emeritus of Agronomy. (1936, 1960)
- Vezey, Edward Earl, Professor Emeritus of Physics. (1920, 1961)
- Waple, Albert Russell, Instructor in Mathematics. (1942)
- Ward, Robert Page, Professor Emeritus of Electrical Engineering. (1925, 1962)
- Weaver, Paul, Distinguished Professor of Geology and Geophysics. (1953)
- Wilcox, George Barton, Professor Emeritus of Education and Psychology. (1920, 1959)
- Winkler, Charles Herman, Professor Emeritus of Psychology. (1923, 1946)
- Young, Vernon Alphas, Professor of Range and Forestry. (1929, 1946)



# *Texas A&M University*

Texas A&M University is the state's oldest public institution of higher education. It owes its origin to the Morrill Act approved by the Congress on July 2, 1862. This act provided for donation of public land to the several states to be sold at auction and the proceeds set aside in a perpetual fund. The act directed that interest from this fund "be used to support a technological college whose objective must be, without excluding other scientific and classical studies and including military tactics, to teach branches of learning pertaining to agriculture and mechanical arts in order to promote the liberal and practical education of the industrial classes in the various pursuits and professions of life ..."

By act of Legislature of Texas, 180,000 acres of land scrip were sold at 87 cents per acre on April 17, 1871. Proceeds from the sale went into \$174,000 of gold frontier defense bonds of Texas, forming the perpetual endowment for the institution. This same act appropriated \$75,000 for the erection of buildings and bound the state to defray all expenses of administration of the college exceeding the annual interest from the endowment. A commission created to locate the institution accepted the offer of 2,416 acres of land from citizens of Brazos County and instruction began in 1876.

As the state of Texas grew, so did its land-grant college. By 1963, the institution had grown in physical size to a \$60,000,000 institution embracing the study of science, the arts, architecture, veterinary medicine, business, education, marine engineering and transportation in addition to the mainstays of engineering and agriculture. Graduate programs of study and research had gained national stature.

In keeping with the diversified and expanded character of the institution, the 58th Legislature of Texas changed the name of the college on August 23, 1963, to Texas A&M University.

## **LOCATION**

The community of College Station surrounds the campus of Texas A&M University. This town boasts of churches representing the leading denominations, an excellent public school system, adequate shopping districts to serve its citizens, and motels and restaurants to accommodate guests of students and staff of the University. Nearby Bryan supplements these advantages.

With the exception of the Maritime Academy, all instruction is conducted on the main campus at College Station. This university community is located 100 miles north of Houston, 100 miles east of Austin, and 170 miles south of Dallas. State highways, Greyhound bus lines, and Trans Texas Airways serve to connect College Station with the rest of the State. Easterwood Field, the University airport, is located approximately two miles from the campus. First-year students in the Maritime Academy attend classes on the main campus. The following three years of instruction are given at the Texas Maritime Academy Campus, located in Galveston, a city 50 miles south of Houston and on the Gulf of Mexico.

## **ACCREDITATION**

The Texas A&M University is accredited by the Southern Association of Colleges and Schools, the Association of Texas Colleges and Universities, and the Texas Education Agency. The curricula in architecture are accredited by the National Architectural Accrediting Board and the veterinary medicine degree program is accredited by the American Veterinary Medical Association Council on Education. All of the undergraduate engineering curricula are accredited by the Engineers' Council for Professional Development. Other accrediting agencies which have approved programs offered at the University are the American Chemical Society and the American Council on Education for Journalism.

## **LIBRARY FACILITIES**

**Cushing Memorial Library:** The main University Library, which serves also as the research library of the Texas Agricultural Experiment Station and of the Texas Agricultural Extension Service, is in a centrally located, air-conditioned building housing a collection of over 350,000 volumes of books, periodicals, government documents,

and other library materials in an open-stack arrangement. A total of 480,000 volumes are owned altogether by Texas A&M University.

The library is a federal depository for United States government documents on a selective basis. Approximately 6,000 serials are currently received, along with over 50 state, national, and foreign newspapers. Special attention has been given to obtaining important foreign language periodicals in all areas. Although the library has been developed chiefly along reference and technical lines, its collections are being expanded to meet the University's broadened needs. Generous contributions from A&M Mothers' Clubs throughout the State have been used to increase substantially the collection of fiction and non-technical popular material. The careful selection of new books in both technical and non-technical areas keeps the collection abreast of modern thought. A well-trained staff of librarians is on duty during most of the hours the library is open.

The more important reference works, including indexing and abstracting services, are shelved in the General Reference Room, second floor. State and federal documents are to be found in the Documents Division, second floor. The library receives on deposit the unclassified reports of the Atomic Energy Commission, as well as selected technical reports of the National Aeronautics and Space Administration. Microfilm, microcard, and microfiche machines are provided for reading materials available in these forms. Photocopy service is available at a nominal charge.

Individual study carrels are provided in the bookstacks for the use of graduate students and faculty members. With the exception of periodicals, government documents, and certain books temporarily reserved by departments for reference or required reading most books are loaned for home use for a period of two weeks with the privilege of renewal for the same length of time. Bound volumes of periodicals may be charged out by graduate students for over-night use only, and a one week charge is given to faculty members.

**Engineering Library:** Formerly the Texas Engineers Library, this branch library was established in 1941 by the Texas State Board of Registration for Professional Engineers in cooperation with the Agricultural and Mechanical College of Texas. It is now housed in Bagley Hall adjacent to the main university library. The collection consists of over 95,000 volumes of books, periodicals, and other library materials in all areas of engineering. The collection is well balanced but is especially strong in aeronautics, air-conditioning, highway engineering, concrete, hydrology, sanitary engineering, petroleum, and welding. Over 1500 periodicals and other serials are currently received, including many in foreign languages and some English translations of Soviet technical journals.

**Veterinary Library:** This branch library is located in the Veterinary Medicine Building and is primarily a reference library with over 12,000 volumes of books and periodicals in the fields covered by the curriculum in the College of Veterinary Medicine. The library subscribes to 441 American and foreign periodicals and receives pertinent publications from other colleges and experiment stations.

**Architecture Library:** This branch library, located in the new Architecture Building, furnishes reading room space and offers reference service. The collection, numbering approximately 7,000 volumes of selected books and periodicals, provides materials in this specialized field for both students and faculty.

**Business Administration Library:** Another branch of the University Library, this collection consists of approximately 8,000 volumes of books and periodicals in the many areas of business administration, such as accounting, insurance, marketing, business law. Over 170 periodicals are currently received and a file of annual reports of corporations is maintained. The library is located in Francis Hall.

**Chemistry Library:** This newest branch library, housed in the Chemistry Building, consists of a collection of over 4,000 volumes of books and periodicals which have been selected for their value as reference material for chemistry.

**Other Libraries:** Many departments maintain working collections of books and periodicals for use within the departments. Some of the collections are fairly large and well organized; others are small but well chosen. Use of these libraries is controlled by the departments concerned.

## THE SUMMER SESSION

Texas A&M University conducts a summer session consisting of two terms of six weeks each for the benefit of both graduate and undergraduate students.

During the summer session courses are offered in most of the departments and are selected to meet the needs of the regular university students. Emphasis is also placed on planning a program for teachers and administrators who wish to do advanced work. A number of departments offer sufficient work for the Master's degree to be earned by attendance during the summer months. Instruction during the summer session is given by members of the Texas A&M University faculty and by teachers of prominence from other institutions.

A separate catalogue for the summer session giving course offerings and other pertinent information is published each spring and is available on request from the Office of the Director of Admissions.

## ADMISSION

### APPLICATION FOR ADMISSION

Any person who desires to apply for admission to the University should write to the Director of Admissions, Texas A&M University, College Station, Texas, for a formal application blank. The applicant should complete the form according to the directions printed thereon and return it to the Admissions Office. If the applicant has attended any other college or university, he must submit a complete, official, and original transcript from each institution previously attended. In such a case, the college transcript will serve in lieu of the high school transcript required of those who have had high school attendance only. It is extremely important that these credentials be submitted in advance of registration. If this cannot be done, the applicant should bring them at the opening of the session. Without the credentials the applicant cannot be admitted, and valuable time will be lost if he has to send for them after arriving at the University.

When admission requirements have been satisfied, the Director of Admissions will then send the applicant a letter of acceptance, a room reservation card, and a physical examination form to be filled out by a physician. The physical examination report must be completed and returned to the Admissions Office prior to the date of registration for classes.

All applicants for admission to the University must be of good moral character, at least sixteen\* years old, and free from contagious or infectious diseases.

In addition to the normal requirements for admission, a student seeking to enroll in the Texas Maritime Academy must satisfy the following requirements:

1. He must be a citizen of the United States.
2. He must be unmarried. (Regulations require that the Maritime Cadet remain unmarried until graduation.)

A high school student who is eligible for admission to the University and who wishes to enter during the summer may well consider the opportunities of combining study and recreation at the Junction Adjunct of Texas A&M University. Excellent studying, living, and recreational facilities are available at this beautiful Kimble County campsite in the heart of the Texas hill country. Application blanks for admission to the Adjunct may be obtained from the Director of Admissions, Texas A&M University, College Station, Texas.

### HIGH SCHOOL UNIT REQUIREMENTS

An applicant must have graduated from a properly accredited secondary school with a minimum of sixteen units (credits) which are acceptable to the University for entrance purposes. Those with superior high school records but who have unit deficiencies will be considered on the basis of their merit. Other applicants who do not present the units required for admission may meet requirements on the basis of a satisfactory showing on their College Entrance Examination Board tests.

\*Texas Maritime Academy students must be at least 17 and not more than 22 years of age on the day of registration.



The sixteen acceptable entrance credits required of all students (with exceptions indicated where applicable) shall be distributed as follows:

Subject	Units of Credit Required	Remarks
English	4	Required of all students. Two units in a single foreign language may be substituted for 1 unit in English.
Social Science	2½	Required of all students.
Mathematics:		
Algebra	2	Required of all students except applicants for liberal arts and teacher education programs, who may substitute ½ unit from the electives below.
Plane Geometry	1	
Trigonometry	½	
Science	2	Required of all students. It is preferred that these 2 units include biology, chemistry, or physics.
Electives	4	Recommended from the following subject areas: foreign languages, mathematics, science, social science, speech. Not more than 3 vocational units may be submitted as electives. Applicants for admission to engineering, mathematics, pre-veterinary medicine, and science are strongly advised to include at least ½ unit elective in advanced mathematics.
Total	16	

### TESTS REQUIRED OF NEW STUDENTS

Texas A&M University requires certain College Entrance Examination Board (CEEb) tests as a part of its admission procedures for those applicants seeking admission to their first semester of college or university work. Results of these tests are to be used for admission, counseling, and placement purposes. The following tests will be required: Scholastic Aptitude Test (SAT), English Composition Achievement Test, Mathematics Achievement Test (Intermediate or Advanced). The College Entrance Examination Board offers these examinations at conveniently located testing centers throughout the United States and in major cities of many foreign countries. Testing dates, locations, and fees required are described in an information bulletin which may be obtained by writing to the College Entrance Examination Board, Box 592, Princeton, New Jersey.

The minimum test score requirements for admission for applicants who have never attended another college or university are stated in terms of a total score on the College Entrance Examination Board's Scholastic Aptitude Test. This total score is the sum of the Verbal and Mathematical scores reported by the College Board. The following test score requirements for the Scholastic Aptitude Test are effective for freshmen entering:

Standing in High School Graduating Class	Minimum Total Score Acceptable for Admission
Highest Quarter	700
Second Quarter	775
Third Quarter	850
Fourth Quarter	925

### ADMISSION BY EXAMINATION

Any or all of the scholarship requirements for admission may be met by passing the entrance examinations. These will be held at the beginning of each semester under the supervision of the University authorities and will cover all the subjects required or accepted for admission as outlined above. Candidates desiring to take examinations at the University should notify the Director of Admissions well in advance of registration.

### ADMISSION BY INDIVIDUAL APPROVAL

An applicant over twenty-one years of age who has not recently attended school and who cannot satisfy the entrance requirements in full may be admitted without examination, subject to the following requirements:

1. He must make application on the official entrance blanks.
2. He must furnish evidence that his preparation is substantially equivalent to that required of other applicants and that he possesses the ability and seriousness of purpose necessary to pursue his studies with profit to himself and to the satisfaction of the University.

### ADMISSION OF TRANSFER STUDENTS

Admission to advanced standing may be granted to an applicant who has satisfied the requirement as outlined below:

An applicant who has attended another college or university must be eligible to return to that institution and also must have for each of the last two semesters, or for the total record if less than two semesters of attendance, a grade point ratio of 1.00 (C-average) or better on all courses undertaken.

An official transcript of the record at each college or university previously attended must be submitted.

An applicant is not at liberty to disregard the record of any previous training and gain admission by individual approval or on the basis of a high school record.

On the basis of these credentials, credit will be given for work completed with a grade of C or better, so far as the work is equivalent in character and extent to similar work at Texas A&M University. Credits given by transfer are provisional and may be cancelled at any time if the student's work in the University is unsatisfactory. Work completed with a grade of D must be validated before it can be transferred. Validation may be by examination or by completion with a grade of C or better of more advanced work in the subject area.

It is essential that all credentials be forwarded to the Director of Admissions well in advance of registration day.

### ADMISSION OF SPECIAL STUDENTS

A limited number of students over twenty-one years of age may be admitted to the University as special students, not candidates for a degree, subject to the following regulations:

1. The applicant must show good reason for not taking a regular course and must submit satisfactory evidence that he is prepared to profit by the special studies he wishes to pursue.
2. Record of his previous scholastic work must be submitted on the official entrance blanks and must be accompanied by a statement showing (1) his experience; (2) a plan of study, enumerating the courses he desires to pursue; and (3) the purpose or end expected to be accomplished by his study.

### ADMISSION OF NONRESIDENT STUDENTS

A limited number of nonresident students who have attended another college or university may be accepted so long as facilities are available. Such students must have maintained a grade point ratio of 1.00 (C-average) or better on all courses undertaken in addition to a grade point ratio of 1.00 (C-average) or better for each of the last two semesters.

A limited number of out-of-state high school graduates may be accepted so long as facilities are available. Such students, in addition to satisfying all other admission requirements, must have made superior records in high school.

Students who are admitted to the University in one curriculum may not be permitted to change to another which is restricted except under the same conditions as apply to new students.

The status of the residence of a student is determined at the time of his first registration in the University, and his residence is not changed by his sojourn at Texas A&M as a student. His residence may not thereafter be changed by him, but, in the case of a minor, it may be changed by his parents, should they move to and become legal residents of the State and maintain such residence for at least one calendar year.

## REGISTRATION

Every student is required to register when he first enters the University and thereafter at the beginning of each semester. Dates of registration for the session of 1965-66 are shown on pages 2-3 of this catalogue.

Registration is not complete until the student pays his fees for the ensuing semester; reports, if not a civilian student, to ROTC headquarters for assignment to an organization; reports to the Housing Manager for assignment to a room or to report his place of residence if not living in a dormitory; and returns his assignment card, properly approved, to the Registrar's Office, where his receipt showing payment of fees will be stamped "Registered in the Registrar's Office."

## EXPENSES

The expenses for a regular session of nine months will vary with the individual concerned and with the course of study pursued. In the case of new students the total cost should range between \$950.00 and \$1,250.00. In general these amounts include four types of expenses: fees payable to the University Fiscal Department; textbooks and supplies; clothing, and military uniform to supplement that furnished by the University; and incidental expenses, estimated to range between \$100.00 and \$200.00 depending upon the individual concerned. Nonresident students should increase these estimated expenses by \$300.00 to cover the nonresident tuition fee.

The total expenses for returning students during a regular session should be somewhat less than those amounts indicated for new students.

The professional College of Veterinary Medicine will be on the trimester program, and expenses for these periods are shown on the following pages.

## PAYMENTS

Payments to the Fiscal Department may be made by cashier's check, personal check, or money order, payable to Texas A&M University. All checks, money orders, and drafts are accepted subject to final payment.

## FEES

The fees for the session of 1965-66 may be changed because of economic conditions or legislative requirements. The fees for all students except those in the professional College of Veterinary Medicine are currently set as shown below:

FULL SEMESTER	FALL 1965	SPRING 1966
Tuition	\$50.00*	\$ 50.00*
Student Services	18.00	18.00
Building Use Fee	16.00	16.00
Property Deposit	10.00	—
Student Activities	23.80	—
Board Including Tax	180.00	180.00
Room Rent (non air-conditioned) and Laundry	107.00	107.00
Room Deposit	20.00	—
Identification Card	1.00	—
<b>TOTAL</b>	<b>\$425.80</b>	<b>\$371.00</b>
Air-Conditioned Room, additional charge	45.00	45.00
<b>TOTAL</b>	<b>\$470.80</b>	<b>\$416.00</b>

Board may be paid in three installments of \$61.00 each with a service charge of \$3.00.

\*The tuition fee for nonresident students is \$200.00 per semester.



The fees for students in the professional College of Veterinary Medicine are shown below:

FULL TRIMESTER	FIRST TRIMESTER	SECOND TRIMESTER	THIRD TRIMESTER
Tuition	\$ 50.00*	\$ 50.00*	\$ 50.00*
Student Services	18.00	18.00	18.00
Building Use Fee	16.00	16.00	16.00
Property Deposit	10.00	—	—
Student Activities	23.80	—	—
Board Including Tax	159.00	159.00	53.00**
Room Rent (non air-conditioned) & Laundry	95.00	95.00	95.00
Room Deposit	20.00	—	—
Identification Card	1.00	—	—
<b>TOTAL</b>	<b>\$392.80</b>	<b>\$338.00</b>	<b>\$232.00</b>
Air-Conditioned Room, additional charge	40.00	40.00	40.00
<b>TOTAL</b>	<b>\$432.80</b>	<b>\$378.00</b>	<b>\$272.00</b>

Board may be paid in three installments of \$54.00 each with a service charge of \$3.00.

For additional information concerning expenses for students in the Texas Maritime Academy, see the Texas Maritime Academy section of the catalogue. All fees are payable in full at the beginning of the semester except board, which may be paid by installments. A \$1.00 service charge for each installment will be assessed. A \$1.00 charge per day will be made on installment payments made after the due date. Students who are delinquent with installment payments for five days will be dropped from the rolls of the University.

## EXPLANATION OF FEES

### Tuition

The tuition fee, fixed by State law, is \$50.00 per semester for the Texas resident and \$200.00 per semester for the non-Texas resident. Payment of this fee entitles the student to register for 12 or more semester hours.

Former students who in either semester do not register on the days set apart for that purpose pay an additional fee of \$4.00.

The fee for courses audited or visited by students shall be the same as for courses for which credit is given.

### Student Services

The student services fee is required of all students but the amount varies with the student's load. Students registered for 7 or more semester hours pay \$18.00; students registered for 6 or less semester hours pay \$6.00. This fee covers the services at the University Hospital, the Memorial Student Center, the intramural program, and the student aid program; however, the full services of the University Hospital will not be available to those students paying service fees of only \$6.00 unless they elect to pay the full fee of \$18.00. Surgical operations and charges for consultations with outside physicians requested by parents are not included. The services of the University Hospital do not include the physical examination required of entering students.

### Property Deposit

The property deposit of \$10.00 is charged to insure against loss by damage, breakage, etc. It is to be paid by all students and is refundable when graduating or leaving the University.

### Student Activities

The student activities fee is optional. It entitles the student to receive the **Battalion** newspaper, the University yearbook, and the magazine published by the college in which the student is registered. It also entitles him to admission to all intercollegiate athletic events played at the University under the auspices of the Athletic Department, to the Town Hall programs, and to the Great Issues series.

\*The tuition fee for nonresident students is \$200.00 per semester.

\*\*This payment is for board through May 28. During the summer months students board at the University Cafeteria, and payment is not made in advance.

For students who do not pay this optional fee for the fall semester, the spring semester activities fee will be \$12.55.

### **Board**

All students living in the dormitories are required to pay for board, room rent, and laundry. Changes from dormitory student to day student will be made only on the last day of installment payments for board.

### **Room Rent and Laundry**

The total amount of room rent and laundry for the semester must be paid at the time of registration. This charge for room rent includes heat, light, and cleaning the corridors but not the rooms. Air-conditioned rooms are available at higher rates.

Rooms are furnished with single bedsteads, mattresses, desks, chairs, and dressers. Students are expected to furnish their own pillows, bedding, and linens.

### **Room Deposit**

The room deposit of \$20.00 must be paid by all students who will reside in the University dormitories before a room reservation or assignment can be made; this amount will be retained as a deposit against damage and breakage. The deposit may be refunded upon request prior to August 15 for the fall semester and January 15 for the spring semester for those students not planning to enroll. Students in the professional College of Veterinary Medicine who decide not to enroll must request their refunds for room reservations by August 15 for the first trimester, December 5 for the second trimester, and by March 5 for the third trimester. Refunds may be made in accordance with the University policy for those students graduating or withdrawing from school after clearance by the Office of Student Affairs.

### **Identification Card**

All students must have an identification card. This card is used in registration procedures, collection of fees, cashing of checks, laundry service, for dining hall privileges, etc.

### **Laboratory Fees**

A laboratory fee ranging in amount from \$2.00 to \$8.00 is charged for each laboratory course each semester.

### **ROTC Uniform Handling**

Students enrolled in military, air, or naval science are required to pay a uniform handling charge of \$8.00.

### **Physical Education Service**

The University will furnish the necessary physical education uniform, except shoes, to all students taking required physical education and to others who wish to use facilities of the Physical Education Department. All such students will be required to pay a handling charge of \$8.00 per semester for this service. The handling charge includes the cost of laundering the physical education uniform after each use. This amount also covers the cost of bowling, swimming, and golf for those students enrolled in these physical education courses.

### **Parking Permit**

All students driving motor vehicles on the campus must pay a fee of \$3.00 per semester for registration and parking.

## **OTHER EXPENSES**

**Textbooks and Supplies:** The cost of textbooks and supplies will vary with the quality of items purchased and with the course of study to be pursued. Engineering students can expect to pay an amount ranging between \$80.00 and \$120.00; other students will probably pay from \$40.00 to \$60.00. These amounts are estimates for the combined fall and spring semesters.

**Uniforms:** Members of the ROTC will be furnished most of their uniform equipment. Cadets will find it necessary to supplement the uniform issued by purchases that will have a total value of approximately \$40.00 at the University Exchange Store.

Cadets will pay a handling charge of \$8.00 per year to cover the cost of issuing, receiving, and record keeping of uniforms issued. First year cadets can expect to spend \$20.00 to \$25.00 for alterations of uniforms and sewing of patches on shirts, etc. Since only approved articles of uniform may be worn, new students should purchase uniforms after arrival at the University.

To defray the cost of additional billing and delayed handling, a charge of ten per cent of the value of the uniform articles turned in subsequent to five days following the close of school, with a minimum charge of \$1.00, will be made.

**Other Items:** The University operates a store for the purpose of supplying necessary articles to students. The store carries in stock textbooks, stationery, drawing instruments, toilet articles, and other supplies. All merchandise is sold at the usual retail prices prevailing in the area. Upon recommendation of the Exchange Store Advisory Board, any profit created from the operations of the Exchange Store may be used for student welfare and other purposes of benefit to the student body.

### AUDITING OR VISITING FEE

The fee for courses audited or visited by students shall be the same as for courses for which credit is given.

### REFUNDS

Any student withdrawing officially (a) during the first week of class work in a semester or trimester will receive a refund of four-fifths of the tuition fee; (b) during the second week of class work, three-fifths; (c) during the third week of class work, two-fifths; (d) during the fourth week of class work, one-fifth; (e) after the fourth week of class work, nothing. No refunds will be made until ten days have elapsed from the time the fees were paid.

Students withdrawing from a laboratory course during the first week of class work in a semester or trimester will receive a refund of 100% of the laboratory fee paid. Students withdrawing from a laboratory course after the first week of class work in a semester or trimester shall not be entitled to a refund.

Students withdrawing officially from school during the first week of a semester or trimester will receive a refund of 100% of the Student Services and Physical Education Service fees. A student withdrawing after the first week in a semester or trimester will receive no refund.

A refund of board and laundry payment will not be made unless there is a consecutive absence of not less than ten days due to illness of the student or a member of his family, or for some other unavoidable cause. Laundry refunds are computed on a weekly basis.

There will be no refund of room rent after classes start.

Students withdrawing during the first week of the fall semester or first trimester will receive a 100% refund of the Student Activities fee. Students withdrawing after the first week of the fall semester or first trimester and before the end of the first week of the spring semester or second trimester will receive a refund of \$6.55 and will be entitled to receive a copy of the student annual. Students withdrawing after the first week of the spring semester or second trimester will receive no refund.

Students not enrolled in the fall semester or first trimester and withdrawing during the first week of the spring semester or second trimester will receive a 100% refund of the Student Activities fees. No refund will be made to students withdrawing after the first week, but the student will be entitled to receive a copy of the student annual.

### REDUCTIONS

No reductions will be made in charges for board, room rent, or laundry in case of entrance within ten days after the opening of a semester or trimester, nor will a refund be made in case of withdrawal during the last ten days of a semester or trimester or the last ten days for which payment is made.

### UNPAID CHECKS

If a check or draft accepted by the Fiscal Department is returned unpaid by the bank on which it is drawn, the person presenting it will be required to pay a penalty of \$2.00.



## DUPLICATE RECEIPTS

Duplicate receipts for fees paid by students will be issued on payment of twenty-five cents.

## DAY STUDENTS

Day students pay all specified fees and charges except board (optional), laundry, and room rent.

## PART-TIME STUDENTS

The tuition fee for students registering for less than 12 credit hours will be reduced by \$4.00 for each credit hour less than 12 with a minimum tuition fee of \$15.00.

## NONRESIDENT STUDENTS

In accordance with the regulations of the governing board of the University, the following definitions, general policies, and regulations will apply to nonresident students. Any variance therefrom will depend upon the facts in the individual case and the interpretations placed thereon by the admissions officer.

The residence status of a student is determined at the time of his first registration in the University, and his residence is not changed by his sojourn at Texas A&M University as a student except as provided by law. This policy shall apply to both graduate and undergraduate students regardless of any scholarships, student assistantships, or graduate assistantships that may be granted to any student.

In compliance with the State law, the tuition fee for nonresident students is \$200.00 per semester. A nonresident student is hereby defined to be a student of less than twenty-one years of age, living away from his family and whose family resides in another state, or whose family has not resided in Texas for the twelve months immediately preceding the date of registration; or a student of twenty-one years of age or over, who resides out of the State or who has not been a resident of the State twelve months subsequent to his twenty-first birthday or for the twelve months immediately preceding the date of registration. The tuition fee for nonresident students registering for less than 12 credit hours will be reduced by \$16.00 for each credit hour less than 12.

The term "residence" as used herein means "domicile" and the term "resided in" means "domiciled in."

The legal residence of one who is under twenty-one years of age is that of the father. Upon death of the father, the legal residence of the minor is that of the mother. Upon divorce of the parents, the residence of the minor is determined by the legal residence of the person to whom custody is granted by the court. In the absence of any grant of custody, the residence of the father continues to control. Upon death of both parents, the legal residence of the minor continues to be that of the last surviving parent until he becomes twenty-one unless he makes his home with his grandparents, whereupon their residence is controlling.

Individuals who have come from without the state of Texas and who register in an educational institution of the State prior to having resided in the State for a period of twelve months shall be classified as nonresident students; and such nonresident student classification shall be presumed to be correct as long as the residence of such individuals in the State is during their attendance at educational institutions, regardless of whether such individuals have become qualified voters, have registered motor vehicles and paid personal property taxes thereon, have obtained Texas drivers' licenses, or have otherwise attempted to establish legal residence within the State.

A student under twenty-one years of age shall not be classified as a resident student until his parents shall have maintained legal residence ("domicile") in this state for at least twelve months. A student under twenty-one years of age whose parents leave the State to reside in another state normally shall be classified immediately as a nonresident student. It shall be the responsibility and duty of the student to submit legal evidence of any change of residence.

Individuals of twenty-one years of age or less whose families have not resided in Texas for the twelve months immediately preceding the date of registration shall be classified as nonresident students regardless of whether such individuals have become the legal wards of residents of Texas or have been adopted by residents of Texas while such individuals are attending educational institutions in Texas or within a year prior

to such an attendance or under circumstances indicating that such guardianship or adoption was for the purpose of obtaining status as a resident student.

All individuals who have come from without the state of Texas and who are within the State primarily for educational purposes are classified as nonresidents. Registration in an educational institution in the State is evidence that residence is primarily for educational purposes even though such individuals may have become qualified voters, have become legal wards of residents of Texas, have been adopted by residents of Texas, or have otherwise attempted to establish legal residence within the State.

A student twenty-one years of age or older who comes from without the State and desires to establish a status as a resident student must have resided in the State as a legal resident for a period of at least twelve months and must have the intention of establishing a permanent residence within the State during that entire period.

All aliens shall be classified as nonresident students except that an alien who has applied for naturalization in the United States and has received his first citizenship papers or immigrant cards shall have the same privilege of qualifying as a resident student as a citizen of the United States. The twelve months' residence required to establish the status of a resident student shall not begin until after such first citizenship papers or immigrant cards have been received by the alien.

Officers, enlisted personnel, selectees or draftees of Army, Army Reserve, National Guard, Air Force, Air Force Reserve, Navy, Naval Reserve, or the Marine Corps of the United States who are stationed in Texas by assignment to duty within the borders of this state, shall be permitted to enroll themselves, their husband or wife as the case may be, and their children by paying the tuition fees and other fees or charges provided for regular residents of the state of Texas, without regard to the length of time such officers, enlisted personnel, selectees, or draftees have been stationed on active duty within the State. This provision shall extend only during active military service in Texas; and upon such member of the Armed Services being transferred outside the state of Texas, he and his children shall be classified as to residence under the second paragraph of these regulations. Any student claiming the privilege of this section shall submit at each registration a statement by the commanding officer of the post or station at which he or his parent is on active duty verifying the fact of his or his parent's military status.

The residence of a wife is that of her husband; therefore a woman resident of Texas who marries a nonresident shall be classified as a nonresident and shall pay the nonresident fee for registration subsequent to her marriage. A nonresident woman student who marries a resident of Texas is entitled to be classified immediately as a resident student and is entitled to pay the resident fee for all subsequent registrations.

Appointment as a member of the teaching or research staffs or the holding of a fellowship, scholarship, or assistantship shall not affect a student's residence status or the tuition fee to be paid.

It shall be the responsibility of the student to pay the correct fee at the beginning of each semester or term for which he may register, and a penalty of \$10.00 shall be assessed for failure to pay the proper fee.

## VOCATIONAL REHABILITATION AID

The Texas Education Agency, through the Vocational Rehabilitation Program, offers assistance for tuition and required fees to certain students in Texas colleges and universities. Eligibility for such assistance is based on permanent physical disabilities and other chronic conditions.

Application should be made to the Texas Education Agency, Division of Vocational Rehabilitation, Room 505, Varisco Building, Bryan, Texas, or to Doyle Wheeler, Director, Division of Vocational Rehabilitation, Capitol Station, Austin, 11, Texas.

## SCHOLARSHIPS, FELLOWSHIPS, AND AWARDS

The University scholarship program is administered by a Faculty Scholarships Committee. As authorized by the Board of Directors, this committee is composed of the Dean of Instruction, who serves as chairman; the Secretary of the Former Students Association; and a representative, appointed by the President, from the Counseling and Testing Center and from each of the undergraduate colleges of the University.



In general there are three types of scholarships available: (1) Valedictory Scholarships and Opportunity Awards, representing those limited to entering freshmen; (2) scholarships designed for the more advanced undergraduate students, and (3) fellowships and grants-in-aid for graduate students.

The over-all program is designed to encourage and reward scholastic effort on the part of all students; to enable outstanding students to do the best work of which they are capable by removing financial handicaps; and to enable capable and ambitious young men who might be denied an education for financial reasons only to secure that education at Texas A&M University.

### Valedictory Scholarships

A scholarship is offered to the valedictorian who graduates from a secondary school accredited by the Texas Education Agency and who qualifies for admission to the University. The successful applicant must make the highest record among all students, boys and girls, graduating that calendar year, including winter, spring, and summer graduating classes, and must be certified to the University through the Texas Education Agency. The scholarship is valid beginning with the first summer session or long session semester after the holder's graduation from high school. The financial benefit is exemption from payment of tuition fees (\$25.00 for each six week term of the summer session, and \$50.00 each semester of the long session, not to exceed a grand total of \$400.00) and laboratory fees for a period equivalent to four academic years (eight semesters) under the following terms and conditions:

1. The student's initial enrollment must be in this University.
2. To be eligible for the award any semester or summer term, the student must schedule at least 15 hours in a semester of the long session or 6 hours in a six-week term of the summer session.
3. On such a schedule the student must make a grade point ratio of at least 1.00 during the first year in the University to be eligible for the award the succeeding year. After his first year, he must make a grade point ratio of at least 2.00 to be eligible to use the scholarship in the succeeding years.
4. The student's eligibility for any part of the scholarship shall not extend beyond the end of four calendar years from the time of high school graduation.
5. The conduct of the scholarship holder must be satisfactory to the faculty.
6. The student must be a legal resident of the State of Texas for school purposes.
7. Any student who may have lost his scholarship for academic reasons may have it reactivated on the basis of his performance during any twelve-week summer session or long session semester.

### The Opportunity Award Program

This program annually provides approximately 100 four-year scholarships to high school graduates of Texas who are capable of outstanding scholastic achievement and who need financial assistance to attend the University. The awards are made possible through the Texas A&M University Development Fund and by interested citizens and organizations of the State. Financial benefits range in value from \$800 to \$1600 with recipients receiving from \$200 to \$400 each year for four years plus an opportunity for additional earnings from student employment if necessary. Most of the awards are unrestricted as to course of study or degree objective in the University.

Graduates of accredited high schools of Texas who have not attended another college or university, who are legal residents of this state, and who need financial assistance to attend the University are eligible to make application for an Opportunity Award Scholarship. To be considered for such a scholarship, an applicant must satisfy the admission requirements of the University, must make formal application for an award on forms provided by the University; and must enter the state-wide competition which is held each spring. Selections are made by the Faculty Scholarships Committee on the basis of the applicant's academic record in high school; his scores on three College Entrance Examination Board tests; his evidence of initiative, leadership, and other traits of good character; and his need for financial assistance. The required C.E.E.B. tests are as follows: (a) Scholastic Aptitude Test, (b) Achievement Test in English Composition, and (c) Achievement Test in Mathematics (intermediate or ad-



vanced). In order for the award to be continued from semester to semester, the recipient must maintain a standard of scholastic achievement and personal conduct satisfactory to the Scholarships Committee.

This program is usually announced officially during the latter part of the fall semester each year. Official announcements and application blanks are distributed over the State at that time and are also made available to those interested upon request. Requests for additional information and application forms should be addressed to the Secretary, Faculty Scholarships Committee, Texas A&M University, College Station, Texas, 77843.

### **Scholarships for Advanced Undergraduate Students**

One-year scholarships ranging in value from \$100 to \$750 are available to outstanding students already enrolled in the University. Some of these are limited to certain fields of study and to individuals who have attained a necessary academic classification, while others are unrestricted in this regard. Recipients are usually chosen by the Faculty Scholarships Committee in April or May each year with the basis of selection determined by the nature and intent of the award.

Some of these scholarships are given as "rewards for a job well done" and are intended to recognize outstanding scholastic achievement or other meritorious accomplishments. As such, they not only benefit financially the student concerned but also encourage and promote scholastic attainment and leadership on the part of other individuals. In addition to the reward type of scholarship, others are made available to outstanding students who must have financial assistance in order to remain in school or to do a high quality of work while enrolled. It is the general objective of this type of award to encourage every scholar to go as far as his abilities and ambition will carry him.

Information regarding scholarships for advanced undergraduate students may be obtained from the Secretary, Faculty Scholarships Committee, Texas A&M University.

## **STUDENT LIFE**

### **LEADERSHIP AND GUIDANCE**

Leadership and guidance in the area of student life are the responsibilities of the Dean of Students. Responsibility for the enforcement of University regulations lies with the Director of Student Affairs for civilian students and with the Commandant of Cadets for military students. Appeals by civilians may be made to the Director of Student Affairs and by military students to the Commandant.

The student government of the University is carried out through the Student Senate. The office of the Advisor of the Student Senate is the Dean of Student's Office, YMCA Building.

The Civilian Student Council serves as the official governing body for civilian students, with responsibility in those areas affecting civilian students only. The Council is advised by the Department of Student Affairs.

### **THE OFFICE OF THE DEAN OF STUDENTS**

Responsibility for the development and welfare of the student in areas other than academic is placed with the Office of the Dean of Students. Activities are provided which help to meet the physical, emotional, social, and spiritual needs of students.

Student personnel departments and offices under the direction of the Dean of Students include the following:

- Commandant (Headquarters of the Corps of Cadets)

- Army ROTC

- Air Force ROTC

- Naval ROTC (Maritime Academy Cadets)

- Student Affairs, Veterans Advisory Service, Foreign Student Advisor, Campus Security, Housing and Civilian Counselors.

- Memorial Student Center

Placement of Graduates, Student Aid and Loan, Scholarships, and Continuing Education  
Student Health Services and Campus Hospital  
Y.M.C.A. and the All Faiths Chapel

## STUDENT AFFAIRS

The Department of Student Affairs includes the activities and functions of the War Orphans Advisors Office, the Housing Office, Civilian Dormitory Counselors, the Foreign Student Advisor's Office, and the Campus Security Office.

## WAR ORPHANS ADVISORY SERVICE

Texas A&M University provides advisory service to war orphans and assists them in securing proper benefits from the Veterans Administration. This service is provided in the office of the Department of Student Affairs, Y.M.C.A. Building.

## HOUSING AND MEALS

**Single Students:** Unless they are living with their families, all students are required to live in University-owned dormitories on the campus.

Reservations are filed in the order in which they are received and will be held only until 5 p.m. of the regular registration day. Reservations made by students who do not complete their registration on the regular registration day by 5 p.m. may be canceled, and the space will be assigned to another applicant.

A new student may file a room reservation as soon as he has been accepted by the Director of Admissions and Registrar. A room reservation card will be mailed to him with his acceptance letter, and the form should be completed as directed and returned to the Fiscal Department with a check or money order for \$20.00. The \$20.00 will be deposited to the student's account, where it will remain until he moves off campus, withdraws from the University, or graduates, when it will be refunded if all of his university accounts are "clear." The Fiscal Department will send the reservation card and receipt to the Housing Office, which will verify dormitory assignment to the student. Should a student decide that he cannot enroll at the beginning of the ensuing semester and so notify the Housing Office, the reservation will be canceled. If the cancellation is made prior to August 15th for the fall semester, January 15th for the spring semester, May 15th for the first summer term, or July 1st for the second summer term, the \$20.00 deposit will be refunded; but if the cancellation is made after these dates, the \$20.00 will be retained. Students in the professional College of Veterinary Medicine who decide not to enroll must request their refunds for room reservations by August 15th for the first trimester, December 5th for the second trimester, and by March 5th for the third trimester. When the student reports to the campus for registration, he will secure his room assignment and room key at the Housing Office, ground floor, YMCA Building.

All students residing on the campus are normally required to take their meals in one of the two dining halls on the campus, operated by the Subsistence Department of the Business Office. Each has a seating capacity of 4,000 and furnishes the students at cost well-balanced meals prepared under the direction of experienced supervisors.

**Married Students:** The University has apartments for married students, consisting of 353 furnished two-bedroom apartments, 312 furnished one-bedroom apartments, and 113 unfurnished two-bedroom apartments. More complete information and application forms may be obtained from the Housing Office, ground floor, YMCA Building.

## FOREIGN STUDENT ADVISOR

The Office of the Foreign Student Advisor is located in Room 204, Counseling and Testing Center. Information relative to immigration regulations and assistance with problems peculiar to students from other lands may be obtained from this staff member.

## REGISTRATION OF MOTOR VEHICLES

All students and employees who drive motor vehicles on the campus must have them registered in the Office of Campus Security, YMCA Building, within 48 hours of the time that they are brought on the campus.

Students are assigned parking areas according to their housing assignment. Cars must be parked in these designated areas during the regular classroom hours.

### MEMORIAL STUDENT CENTER STUDENT PROGRAMS

Dedicated to the memory of the men of Texas A&M University who gave their lives during World Wars I and II, the Memorial Student Center was erected to foster the social, cultural, and recreational phases of student life.

General facilities of the Memorial Student Center include a dining room, cafeteria, snack bar, gift shop, telephone and telegraph center, barber shop, 66 guest rooms, travel agency, check cashing and information center, student organizations banking center, and United States Post Office. Recreational facilities include bowling lanes, table tennis and billiards area, game room, browsing library, piano room, music practice rooms, ballroom, and record playing room. A large number of meetings, receptions, exhibits, and social affairs given by the student and staff organizations of the University are held at the Center.

Included in a special activities program of the Memorial Student Center Directorate are the following special interest committees: Music, Talent, Dance, Radio, Camera, Contemporary Arts Committee, Travel, Leadership Training Program, Great Issues, Flying Kadets, Bowling, Billiards, Table Tennis, Chess, Public Relations, Personnel, Town Hall, and the Student Conference on National Affairs. These activities are governed by the Memorial Student Center Council, composed of nine students, five faculty members, and two former students, with a student as president of the Council. The Directorate, which is composed of the various committees, plans and directs the entire program. Many positions of leadership are open in this student program for those who join the committee activities at an early date.

The Memorial Student Center Student Program Staff is charged with counseling and fiscal operation of many campus student activities. It helps to sponsor cultural, recreational, and entertainment activities on the campus, including the campus movie program, music activities, social activities; serves as banker for all recognized student organizations (approximately 325); is the agency of the University to officially recognize student organizations; and serves as financial advisor, "Club Aid" for departmental student organizations, student government, and other co-curricular activities.

The Memorial Student Center Building Cashier provides banking service for the numerous student organizations on the campus and for the Memorial Student Center businesses. The Cashier's window is also headquarters for the sale of tickets for class dances, military organization balls, and for graduation announcements.

**Clubs:** Many opportunities exist for students interested in co-curricular club activities. There are more than 300 organizations on the campus, ranging in interest from hometown clubs to technical societies. Their activities include discussion meetings, movies, smokers, barbecues, dances, and inspection trips.

**Dances and Social Affairs:** Social life at Texas A&M University is highlighted by numerous dances and social functions. The various classes, military units, and civilian organizations sponsor dances. In addition, certain all-school social functions are held for which outstanding name bands provide music. The most elaborate function is the traditional Senior Ring Dance and Banquet, when graduating seniors and their guests dance to an outstanding orchestra of the year. All parties and other social functions, whether held on or off the campus, must be approved by the University.

**Town Hall:** The Town Hall series includes the best obtainable artists in the fields of music, dance, and theater. Activity fees and the sales of season and individual tickets make it possible to bring these outstanding programs to the student body at low prices.

**Singing Cadets:** This widely known singing unit consists of more than sixty students, both civilian and military. The group has appeared in many southwestern cities and in Mexico, on numerous broadcasts and telecasts, and on various other entertainment programs. For the past few years this group has served as the official glee club for the coast-to-coast television program "Miss Teen-Age America." Membership is selected from the entire student body by auditions held early in the fall semester.

**Dance Band:** The Aggieland Dance Band is made up of both civilian and military students. Each year the band plays for various dances and shows on and off the campus. Dance tours are made throughout the State to play for A&M Club dances. Members are



chosen by competitive audition at the beginning of the fall semester. Rehearsals are held once a week.

**Music Practice Rooms:** For students interested in music, an area in the lower level of the Memorial Student Center with four practice rooms and pianos is provided. It is open for use from 8 a.m. to 10 p.m., and may be used by special appointment obtained at the main desk of the Center for instrumental or vocal groups.

**Guion Hall Theater:** The Guion Hall Theater is operated on weekends to provide economical and convenient movie entertainment for the student body and University staff. Although good pictures are shown, they are usually second-run shows in order to keep costs as low as possible. Guion Hall is also used as a meeting place, a concert hall, and for dramatic presentations.

**The Grove:** The Grove is an outdoor concrete recreational area with a stage, utilized by the Memorial Student Center for the scheduling of movies, intramural athletics, concerts, dances, picnics, games, and festivals.

### THE AGGIE PLAYERS

This is a student organization that offers active participation in theater work for academic credit or as extracurricular activity. Six courses in theater are available: Theater Arts 378, Techniques of Acting; Theater 380, History of the Theater; Theater Arts, 381, Introduction to Theater; Theater Arts 382, Technical Theater; Theater Arts 383; Techniques of Directing; and Speech 407, Oral Interpretation. The Aggie Players present three to five major dramatic productions a year, and any student is invited to join.

### DEBATE ACTIVITIES

The Aggie Discussion and Debate Club is sponsored jointly by Student Activities and the Department of English. Activities include participation in approximately six tournaments, extemporaneous speaking, and persuasive speaking. Interested students may obtain further information from the Department of English.

### STUDENT HEALTH SERVICES

The University Hospital provides infirmary space for over 100 patients, as well as a modern clinic for out patient care. The facilities include a complete physiotherapy department, modern laboratory, and a new x-ray department. The medical staff includes specialists in the fields of medicine, surgery, radiology, and ear, nose, and throat.

The Clinic is open from 8 a.m. to 5 p.m. on weekdays and from 8 a.m. to 12 noon on Saturdays. The Student Services fee provides for clinic visits, diagnostic examinations, care for acute illnesses, emergency care for accidents, and 10 days of infirmary care each semester in cases requiring hospitalization. Routine medications for acute illnesses, x-rays, laboratory tests, and local ambulance service are also furnished the student without charge. A staff of registered nurses is on duty, with a staff physician on call, to care for emergency cases at any hour.

Students of the Texas Maritime Academy are provided free Public Health Service in Galveston.

All students are encouraged to take out the Accident Insurance Policy which is available at reasonable cost.

The water of the University is supplied through a University-owned water supply system and comes from four deep wells located nine miles northwest of the campus. As a part of the sanitary work carried on throughout the entire year, the University laboratories make bacteriological checks of this water supply and of the milk supply at regular intervals.

The University is particularly concerned with the maintenance of the health and physical development of its students. It provides the finest outdoor and indoor swimming pools in the State, as well as tennis courts, a golf course, and athletic fields. An adaptive physical education program is provided for those students needing special exercises or therapy for physical defects.

## RELIGIOUS ACTIVITIES

Texas A&M University is non-sectarian, but its high objectives cannot be achieved unless its educational program is founded on a solid religious life. Divorced from the spiritual aspirations of the individual and of the group, education cannot be complete. The basic purpose of education is a normal religious life to the end that young people may be not only more efficient but better motivated by a sense of duty and obligation. Thus, in an atmosphere of tolerance and mutual respect, every student is encouraged to maintain his ties with the religious group to which such association may be made most fruitful.

**Young Men's Christian Association:** The YMCA endeavors to develop the full, rounded man by emphasizing growth in mind, body, and spirit. Because of the effect of the YMCA on the lives of many students, it holds a coveted spot in the hearts of Aggies.

The varied and vigorous program of the YMCA depends on student participation, initiative, and leadership. The program is centered around stimulating the moral and spiritual lives of the students and includes religious discussions, Bible study, conferences, intercollegiate visits, steak fries, leadership development, Freshman Camp, United Nations Club, Preparation for Successful Marriage Forums, and many other worthwhile projects.

**All Faiths Chapel:** The beautiful All Faiths Chapel, a gift of the Former Students, is made of Austin limestone and glass, and is modern in design. In addition to providing the opportunity for individual meditation and prayer and serving as a meeting place for small religious groups, the Chapel makes available a library of religious books and affords accommodations for small weddings, funerals, memorial services, baptisms, vesper services, and other religious rites. The Chapel is open at all hours for meditation and prayer.

In addition to the on-campus University religious life, there are ten churches near the campus whose primary purpose is to serve the spiritual needs of the students. The campus religious leadership is deeply conscious that the students are in perhaps the most formative period of their lives and feel keenly the responsibility for their spiritual development.

The programs of the respective churches are aimed primarily to meet the student needs. Many of the churches have distinct student departments with specialized leadership whose sole responsibility is that of ministering to the students. The pastors of the churches also give as much time as is necessary to the students for personal counseling.

The churches serving the campus have a program similar to that of the home church with an expanded young people's department and dominant emphasis upon student interests. In addition to the special student emphasis, they have the customary Sunday worship periods, church schools, and young people's organizations promoted to stimulate clear and constructive thinking in the important field of religion. The student departments are expanded to offer wholesome recreation and social life and social service.

## CORPS ACTIVITIES

The aim of the Corps of Cadets is to offer a sound collegiate education in both mind and body under strictly military discipline. The method of administration of this military discipline and its extension to all phases of the cadet's non-academic life are distinctive at the Texas A&M University. Students are organized along military lines and observe military practices at all times. They habitually wear the prescribed uniform on the campus and live in rooms assigned to them on the basis of their military organization. From reveille to taps, every hour of the cadet's time is accounted for. The regular habits of study and living thus formed, the attention to duty, obedience to authority, and love for order, inculcated are considered among the most valuable features of the military education. While some of the graduates enter the military profession, hundreds in all walks of civil life attest to the high value of the training received at this institution.

An integral part of the military system is the requirement of freshmen of certain extra duties and activities at the beginning of their University career. During the early weeks of their first year the cadets have special drills under their cadet officers and follow a rigorous program of behavior designed to improve their military posture and

to inculcate early respect for upperclassmen who are their military superiors. These special activities do not interfere unduly with the freshman's academic program nor usurp his prerogatives as a private individual. They are supervised by responsible cadet officers under the general supervision of the Commandant and are to be distinguished from irresponsible hazing which is forbidden by the rules and regulations of the University.

In keeping with the democratic ideals of the Texas A&M University, the formation of exclusive societies or fraternities, membership in which is based on other requirements than individual worth and achievement, is forbidden. When new cadets report to the University, all are at once put in uniform and, as far as possible, all artificial distinctions based on wealth, position, or influence are minimized and the cadet is encouraged to achieve his place by individual merit. All cadets live under practically identical conditions, and all are rated by the same standards, but there is a wide range of opportunity for each to develop in accordance with his needs and aptitudes.

Among Cadet Corps organizations is the Ross Volunteer Company, a military group composed of outstanding cadets. This unit was organized in 1887 by Colonel T. M. Scott, business manager of the College, for the purpose of banding together the most proficient military men in A. and M. College into a precision drill team. They were first called the Scott Volunteers. The name was changed to Ross Volunteers in 1891 to honor Governor Lawrence Sullivan Ross, who in that year became President of the College. It was originally the plan of the organization to change its name in honor of each succeeding president of the College, but in 1902, at President Harrington's request, the idea was dropped and the name Ross Volunteers made permanent.

There are several important cadet organizations that do not come under a specific classification. The following should be mentioned as having distinctive functions in cadet life: The Aggie Band, the largest college or university military band in the United States; the Rifle and Pistol Teams, which complete in national matches; and the Freshman Drill Team, a precision military drill team.

Students of the Texas Maritime Academy are an integral part of the Corps of Cadets.

## STUDENT PUBLICATIONS

The Student Publications program at Texas A&M University provides students with excellent opportunities to learn and practice magazine and newspaper technique. Management of the departments is vested in the Director of Student Publications and the Student Publications Board, composed of faculty members from each of the degree-granting colleges.

The following seven publications are published, each supervised by a student editor:

**The Battalion:** This student newspaper is published four days a week for campus readers and residents of the city of College Station. Staff members have excellent opportunities to learn newspaper management and responsibility in addition to news-writing and editing. Junior and senior editors receive salaries commensurate with their responsibilities.

**The Aggieland:** The yearbook of the student body has the largest staff requirement in Student Publications, and recruits from all classes are welcomed to document the school year's activities.

**The Engineer:** Published six times annually by students in the College of Engineering, this journal promotes scholarly investigations and technical writing.

**The Agriculturist:** Students in the College of Agriculture produce a quarterly magazine which concerns itself with articles related to the field of agriculture.

**The Southwestern Veterinarian:** Produced quarterly by students of the College of Veterinary Medicine, this publication is rated as one of the nation's leading college veterinary journals.

**The A&M Review:** A magazine of campus-wide interest is edited by students in the College of Arts and Sciences and published four times a year.

**Student Directory:** Each year the Office of Student Publications publishes a University directory of students, faculty, and staff.



Participation in Student Publications is not limited to any course of study or student classification. All interested students should contact the department, which is located on the ground floor of the YMCA Building.

### THE TEXAS AGGIE BAND

The Texas Aggie Band is the official band of the Texas A&M University. It is often referred to as the "pulse of the Spirit of Aggieland" and furnishes music for military ceremonies, yell practices, and athletic events.

The Texas Aggie Band is housed as a military unit of the Corps of Cadets, and band members may pursue either the Army or Air Force ROTC program. Band members may take any course of study offered at the University. As the University has no School of Music, the total rehearsal time is limited to approximately four and one-half hours per week.

Interested new students should indicate on the advanced room reservation card their desire to participate. No try-outs are necessary. Although a large number of University-owned and government-owned instruments are available for issue, it is advised that students having their own instruments bring them.

### INTRAMURAL ATHLETICS

Intramural athletics feature contests among military units and among civilian organizations. A separate program is maintained for military freshmen. The intramural program, which is one of the most outstanding in the country, includes badminton, basketball, bowling, fencing, flag football, golf, handball, horseshoes, rifle, softball, swimming and diving, table tennis, tennis, track, volleyball, and wrestling. Ample physical facilities are available to accommodate these comprehensive intramural activities.

### INTERCOLLEGIATE ATHLETICS

Texas A&M University is a member of the Southwest Athletic Conference, which embraces eight leading major colleges and universities — the University of Texas, Texas A&M University, Baylor University, Rice University, Texas Christian University, Southern Methodist University, the University of Arkansas, and Texas Technological College. The intercollegiate program includes football, baseball, basketball, track, cross country, swimming, tennis, and golf. Varsity teams in each sport are known as the Texas Aggies, and the uniforms used by the players are in the school's colors, maroon and white.

### OFFICE OF PLACEMENT AND STUDENT AID

#### Employment for Graduates

The University feels a definite responsibility for the proper professional placement of its graduates. Assistance in fulfilling this responsibility is shared jointly by the faculty and the Office of Placement and Student Aid. The function of this office is to maintain active contact with prospective employers of the graduating students and alumni in such manner that well qualified men may be directed to suitable job opportunities.

Supplementing assistance in securing professional employment, this office co-operates with other University departments in an educational program designed to acquaint undergraduates with opportunities in the fields of work in which they are interested, and to advise on problems which will be met in entering professional employment. Assistance is given students in preparing credentials for submission to employers as well as advice on the proper approach in seeking a job. Assistance is also given undergraduates in securing employment during the summer vacation.

Seniors and graduate students who wish to make use of these services are requested to file a record of their qualifications with the Placement and Student Aid Office early in the year in which their university work will be completed. There is no charge for this service other than for personal leaflets, which are prepared at cost on request.

#### Employment for Students

Part-time employment of resident students is coordinated by the Office of Student Aid, a part of the services of the Office of Placement and Student Aid. Every effort

is made to develop new employment opportunities. To become eligible for employment, a student must have been admitted to the University by the Director of Admissions and have an accepted application on file with the Office of Student Aid. Continued eligibility for employment is contingent on satisfactory performance of work and on the ability of the student to maintain good scholastic standing.

Ordinarily only those students whose financial resources are limited may be considered for employment. Assignments are made primarily on the basis of need and sincerity of purpose.

### Loan Funds

The University is participating in the National Defense Education Act Student Loan program and in the United Student Aid Fund, Inc. Available funds are limited, and application should be made not later than May 15 for the next school year or December 1 for the next Spring semester. Inquiries should be addressed to the Placement and Student Aid Office.

The Office of Student Aid administers other substantial loan funds which are available to students who have completed at least one successful semester of attendance.

Smaller emergency loans are available through the Office of Student Aid to students already enrolled. Emergency type small loans, limited to \$20.00 for 30 days, are available to students on presentation of identification card and current fee slip. A small service charge is made for these loans.

Loan eligibility is based upon the student's satisfactory record, and the amount of each loan depends upon the student's actual needs.

## ACADEMIC REGULATIONS

Certain academic regulations have been set up by the faculty for the purpose of assisting the student to secure the maximum benefit from his studies. These regulations, contained in the copy of **University Regulations** given to each student when he enters the University, serve as a guide in such important matters as choice of course and subjects, methods of study, attendance, examinations, promotion, and graduation.

By means of reports at regular intervals, frequent conferences with the deans, the Registrar, Office of the Dean of Students, and members of the teaching staff, the authorities of the University keep in close touch with the student's progress; and such advice and counsel are offered from time to time as seem justified in each case. For failure to keep up with his studies, the student may at any time be dropped from the rolls of the University.

The University reserves the right to modify the curricula or withdraw any course when it appears wise to do so.

### DEGREES OFFERED

The following degrees are offered for the satisfactory completion of resident study in the appropriate curriculum:

- Bachelor of Arts (B.A.)
- Bachelor of Business Administration (B.B.A.)
- Bachelor of Science (B.S.)
- Bachelor of Architecture (B.Arch.)
- Bachelor of Petroleum Engineering (B.P.E.)
- Doctor of Veterinary Medicine (D.V.M.)
- Master of Agriculture (M.Agr.)
- Master of Architecture (M.Arch.)
- Master of Arts (M.A.)
- Master of Business Administration (M.B.A.)
- Master of Computing Sciences (M.C.S.)
- Master of Education (M.Ed.)
- Master of Engineering (M.Eng.)

Master of Science (M.S.)  
Doctor of Education (D.Ed.)  
Doctor of Philosophy (Ph.D.)

On the basis of acceptable professional experience, the following professional degrees in engineering are offered to graduates of the University:

Aerospace Engineer (Aero.E.)  
Agricultural Engineer (A.E.)  
Architectural Engineer (Arch.E.)  
Chemical Engineer (Ch.E.)  
Civil Engineer (C.E.)  
Electrical Engineer (E.E.)  
Geological Engineer (Geol.E.)  
Industrial Engineer (Ind.E.)  
Mechanical Engineer (M.E.)  
Petroleum Engineer (P.E.)

### REQUIREMENTS FOR A BACCALAUREATE DEGREE

The diploma of the University, with the appropriate degree, will be granted to the student who has made formal application for the undergraduate degree and has satisfied the following requirements:

1. He must complete with a least a C average one of the regular courses of study leading to a degree.
2. The total number of grade points earned at this institution in courses applied to this degree must equal at least the number of hours which he carried in courses at this institution which are applied to this degree. Grades of F or WF shall be included, except such grades and grades of D made in the freshman year or summer session preceding that year which are subsequently repeated at this university with a grade of C or better during the student's first four semesters at this University. Grades of WP shall be excluded.
3. The total number of grade points earned at this institution in courses in his major department applicable to this degree must equal at least the number of hours which he carried at this institution in his major department which are applied to this degree. Grades of F and WF shall be included, but grades of WP shall be excluded.
4. Grades made in courses elected in excess of a student's degree requirements shall be counted, but if failed such courses need not be repeated.
5. A candidate for a baccalaureate degree is required to take the Graduate Record Examination in the semester preceding the semester or term in which he expects to receive his degree.
6. Students of the Texas Maritime Academy are required to pass an examination administered by the United States Coast Guard for Third Mate or Third Assistant Engineer, United State Merchant Marine.
7. He must have settled all financial obligations to the University.
8. He must be formally recommended for graduation by the Academic Council after consideration of his complete record.
9. Unless registered in absentia or excused by his dean, he must be present in person at the graduation exercises.

These requirements must be completed and all grades on record in the Registrar's Office not later than 5 p.m. on Thursday preceding Commencement Day.

Requirements for an advanced degree are outlined by the Graduate College.

### APPLICATION FOR A DEGREE

During the semester or summer session preceding the conferring of the degree, a student must be officially registered in the University. Formal application for degrees must be submitted to the Registrar, on forms provided for that purpose, not later than



90 days prior to the end of the semester, or 30 days prior to the end of the summer term, in which the student expects to complete his requirements for graduation.

In order to be a candidate for a degree at the end of a semester or summer term, a student at the beginning of that semester or term must fulfill the following two conditions:

1. He must be registered for the courses necessary to complete the requirements of his curriculum.
2. For work of his final semester or summer term, he must not lack a grade point ratio in excess of 1.50 in his major field and for his over-all program of studies in order to meet the grade point requirement for graduation.

### **RESIDENCE REQUIREMENT**

A candidate for a baccalaureate degree must complete the requirements of the final year's work of his curriculum in residence at this institution except that six semester hours may be accepted in transfer. However, in every case the student must complete at least thirty-six semester hours of upper level work of the last two years of his curriculum at this institution.

In satisfying baccalaureate degree requirements, a junior college student transferring to this University must complete in residence at least the equivalent of the total semester hours required in the junior and senior years of his curriculum minus six hours. The work completed at Texas A&M University must include thirty-six semester hours of upper level work of the last two years of his curriculum.

Candidates for a baccalaureate degree in the College of Agriculture will be expected to complete approximately the last two years in residence at this institution.

A student may qualify for the Bachelor of Science degree by completing the three-year premedical curriculum at Texas A&M University and at least one year at a Class A medical school, with a minimum total of 137 acceptable semester hours, subject to the usual grade point requirement.

A student may qualify for the Bachelor of Science degree by completing the three-year premedical curriculum at Texas A&M University and at least one year at a Class A dental school with a minimum total of 137 acceptable semester hours, subject to the usual grade point requirement.

A student may qualify for the Bachelor of Arts degree by completing the three-year prelaw curriculum at Texas A&M University and one year at an accredited law school with a minimum total of 137 acceptable semester hours, subject to the usual grade point requirement.

### **GRADUATION WITH HONORS**

All candidates for baccalaureate or Doctor of Veterinary Medicine degrees are eligible for graduation with "Honors." Graduation with Honors shall be based upon the average of all grades made by a student on the courses taken at Texas A&M University. Those students who complete less than seventy-five semester hours of credit at Texas A&M University must show a grade point ratio on all work done elsewhere equal to that required at this university for the appropriate category for honors. They shall be designated as follows:

- (1). With High Honors: To be graduated with "High Honors" a student must have a grade point ratio of 2.80 or above.
- (2). With Honors: A student may be graduated with "Honors" if his grade point ratio is within the range of 2.50 to 2.79 inclusive.

### **TWO DEGREES**

A candidate for a second Bachelor's degree must have been in residence at least two academic years and must have completed all the essential work of the second curriculum not covered in the first; in all such cases the total amount required must be at least 30 semester hours additional to the greater number required for either degree.

### **CHANGE OF CURRICULUM**

Applications for change of curriculum shall be passed upon by the deans of the colleges and schools concerned. A student under 21 years of age must have the written consent of his parent or guardian.

## CREDIT BY EXAMINATION

Academic credit may be given for satisfactory scores on the College Board Advanced Placement Examinations in the following subjects:

<b>American History</b>	<b>French</b>
<b>Biology</b>	<b>German</b>
<b>Chemistry</b>	<b>Mathematics</b>
<b>English Composition</b>	<b>Spanish</b>

The University offers its own series of advanced placement examinations. These may be taken instead of the College Board Advanced Placement Examinations to obtain academic credit. There is no charge for taking these examinations. The Texas A&M University offers credit by examination in the following courses:

**Biology**, 101, 107, 115  
**Chemistry** 101, 102  
**Engineering Graphics** 105, 106  
**English** 103, 104  
**History** 105, 106  
**Mathematics** 102, 103  
**Military Science** 121, 122, 221, 222  
**Modern Language** 101, 102, 103, 104, 105, 106, 109, 110

The Director of Admissions and Registrar will furnish all necessary information to anyone interested in obtaining credit by means of these examinations.

## TRANSFER OF CREDITS

As a general policy credit will be given in transfer for work completed with a grade of C or better at another properly accredited institution. Work completed with the grade of D must be validated before it can be transferred. Validation may be by examination or by completion with a grade of C or better of more advanced work in the same subject area. Any student desiring to validate work done elsewhere should discuss with the Registrar the conditions necessary for validation of his particular work and secure from him authorization for such action. Credits given by transfer are provisional and may be cancelled at any time if the student's work in the University is unsatisfactory.

Work done in an institution not properly accredited must be validated by one of the two methods of validation already mentioned before it can be transferred.

Acceptance of transfer credit for courses in agriculture will generally be limited to those courses normally taught in the freshman and sophomore years at this institution.

## CORRESPONDENCE COURSES

Texas A&M University offers no correspondence courses. A student in residence at this institution will be permitted to receive undergraduate credit for correspondence courses taken elsewhere only when written permission has been granted in advance by the dean of his college or school.

Credit earned in a course completed by correspondence will be accepted only after a validating examination has been passed unless the final examination is taken under the supervision of the Registrar at this university. An exception will be made in the case of courses taken through the United States Armed Forces Institute.

Not more than twelve semester hours of credit taken in correspondence work may be applied toward the requirements for a degree. No more than 34 semester hours of approved extension class and correspondence study credit may be applied toward a Bachelor's degree.

## REQUIREMENT IN GOVERNMENT AND HISTORY

In order to meet the legal requirements for a baccalaureate degree, all students must have credit for six semester hours of American history or three semester hours of American history and three semester hours of Texas history, in addition to the long-standing government requirement of Government 206 and credit for three semester hours

of military or air science. For those students who do not take military or air science, six hours of government must be completed. Such students must complete Government 206 and 207. This paragraph does not alter the requirements in military training which are covered in a later paragraph.

### **REQUIREMENT IN PHYSICAL EDUCATION**

All students under 21 years of age at the time of entrance are required to complete Physical Education 101, 102, 201, 202.

Transfer students will be given exemption from one semester of required physical education for each semester of course work completed at the other institution.

Students who have completed as much as one year of service in the Armed Forces of the United States on active duty will be exempt from the requirement in physical education.

### **REQUIREMENT IN MILITARY TRAINING**

Any student entering with freshman classification (less than 30 semester hours of credit) who is a citizen of the United States, physically qualified, under 21 years of age, and who has had no previous service with the Armed Forces must successfully complete two years of military training. For any student transferring 30 or more semester hours of credit from another college or university, the military program is optional.

Enrollment in air science, military science, or naval science is synonymous with enrollment in the Corps of Cadets and is a part of military training as offered at this university. The Corps is organized into military units which are constantly under military discipline and supervision; likewise, the members of the Corps are required at all times to wear the appropriate uniform.

Members of the Corps of Cadets, who are housed in military units, will, upon completion of the basic course, make application for advanced course contract, and, if qualified, be enrolled in advanced course ROTC. Students are reminded that acceptance of an advanced course ROTC contract requires completion of the advanced course ROTC curriculum, completion of the ROTC summer camp, and acceptance of a reserve commission if one is tendered. The foregoing become integral parts of the degree requirements of advanced course ROTC students. Therefore, for those students under an advanced course ROTC contract, the University will not grant a degree prior to acceptance of a reserve commission. Likewise, the reserve commission will be withheld from advanced course ROTC students who have completed requirements for a reserve commission until they have completed work for their academic degree.

Students in the Texas Maritime Academy should refer to the paragraphs headed "United States Navy and the Texas Maritime Academy" in the section of this catalogue devoted to the Texas Maritime Academy.

### **ELIGIBILITY FOR AN ADVANCED ROTC CONTRACT**

To be considered for an advanced course ROTC contract a student must: (1) be morally and physically qualified, (2) attain junior classification with a minimum grade point ratio of 1.00, (3) have satisfactorily completed the ROTC basic course or have served at least one year of active military service, (4) attain a passing score on the ROTC qualifying examination.

Where the number of contracts to be awarded is for any reason limited, those candidates with the highest qualifications will receive contracts for advanced training.

### **ACADEMIC CREDIT IN MILITARY TRAINING FOR EX-SERVICEMEN**

Students who have completed one year of service in the Armed Forces of the United States on active duty are exempt from further military training and may be given academic credit of four semester hours for basic ROTC.

Students who have completed six months (under RFA 1955) but less than one year of active duty in the Armed Forces of the United States may be given academic credit for the first year of ROTC. Such students may be given academic credit for two semester hours of basic ROTC.

Students who have served for at least one year in the Armed Forces of the United States on active duty as a commissioned officer are exempt from further military train-



ing and may be given academic credit of sixteen semester hours for basic and advanced ROTC.

A student wishing to receive such credit should file a photostatic or certified copy of his discharge with the Registrar's Office so that appropriate credit may be allowed.

### THE GRADING SYSTEM

Since one attends a college or university to extend his education, his grades are usually taken as an indication of the proficiency of his endeavors. The student's semester grade in a course is based upon recitation, written exercises and tests, laboratory work, and the final examination. The final examination has a weight of one-fourth of the final grade, and the proportionate weight assigned to each of the other factors is determined by the head of the department administering the course.

There are four passing grades signifying various degrees of achievement, and grade points are awarded on the basis of these grades.

Grade	Description	Range (Inclusive)	Grade Points per Semester Hour
A	Excellent	92-100	3
B	Good	84- 91	2
C	Fair	76- 83	1
D	Passing	70- 75	0

The lowest passing grade is 70. There is one failing grade, F, below 70, indicating work of unsatisfactory quality. Credit for a course failed may be obtained only by satisfactorily repeating the course in class, except that in a course including both theory and practice, the head of a department may excuse a student from repeating the practice if his grade in the practice is B or better, and if in the judgment of the head of the department the repetition is not necessary. The student must register for both theory and practice, however.

The temporary grade "Inc." (Incomplete) indicates that the student has satisfactorily completed the course with the exception of a major quiz, final examination, or other work. This grade is given only when the deficiency is due to authorized absence or other cause beyond the control of the student and when the work already done has been of a quality acceptable for the satisfactory completion of the course. The privilege of completing such work is limited to the end of the first month of his succeeding semester in the University; otherwise the student must repeat the course in order to receive credit, unless for good reason his dean grants an extension of time.

Permission to remove a semester grade of "Inc." received because of absence from a quiz or examination may be granted by the head of the department only on receipt of official notice that the absence was authorized or evidence that the cause for the absence prevented making normal preparation to take the quiz or examination before the close of the semester.

When a student resigns or is dropped from the University after the first two weeks of a semester, the Registrar calls for his grades and enters on his permanent record the symbol WP after each course in which he is passing and WF after each course in which he is not making a passing grade. All WF's and F's will be taken into account in determining his grade point ratio thereafter unless for cause the Executive Committee directs otherwise.

The semester grade in a subject which a student is required to drop on account of failure to keep up with the work is F.

### REPETITION OF A COURSE TO IMPROVE GRADE

Any student who wishes to repeat a course to improve his grade in that course must do so before he completes a more advanced course in the same subject-matter field.

### GRADE POINT RATIO

A student's grade point ratio for any period is computed by dividing the total number of semester hours for which he received grades into the total number of grade points

earned in that period. Grades of WF and F are included, but grades of WP are excluded.

Only the record made in course work for which the student was registered in this institution is used in determining his grade point ratio.

## GRADE REPORTS

**Preliminary Report:** A preliminary report of the student's progress is sent to the parent or guardian about eight weeks after the beginning of each semester.

**Semester Reports:** At the close of each semester, a report of the student's work during the semester is sent directly to the parent or guardian.

**Unsatisfactory Work:** During the session the deans receive reports from the members of the teaching staff on students doing unsatisfactory work. These reports form the basis for personal conferences with the students concerned and for special notices to parents and guardians.

**Reports to High Schools:** At the close of the first semester, a report is sent to each accredited high school showing the grades made by the freshmen entering the University from that school.

## DISTINGUISHED STUDENTS

A student who completes a semester schedule of at least 15 hours with no grade lower than C and with a grade point ratio of not less than 2.25 for the semester shall be designated as a "Distinguished Student". In official acknowledgment of the designation, he is issued a Distinguished Student card by the dean of his college.

As a recognition of his scholastic achievement, the University allows a Distinguished Student to present his card to the instructor during the next succeeding semester after he distinguishes and, without requirement or privilege of making up the work missed, absent himself from any theory class except for announced quizzes provided, however, that any student who without permission of the instructor leaves a class to which he has reported shall be given a grade of zero for the day's work. This privilege may be revoked for cause at any time by the dean of the student's college.

## HONORARY SCHOLASTIC SOCIETIES

Students ranking near the top of their class scholastically will be considered for admission to one or more of the national honorary societies described below. The honor societies are intended to reward the student of character and ability, and membership in them is a well-recognized mark of distinction which becomes a part of one's permanent record.

**Alpha Delta Sigma.** This national professional fraternity in advertising is for students who have declared an interest in advertising as a career and who have demonstrated an above average aptitude in the field. Membership is by election. Its purpose is to encourage and develop leadership in advertising.

**Alpha Kappa Delta.** This is the only national sociology honor society. Membership is by election and all graduate and undergraduate students with at least a "B" average in sociology, an over-all grade point average of 2.00, and at least 10 hours of sociology are eligible as candidates for this society.

**Alpha Pi Mu.** This fraternity is a national industrial engineering society. Eligibility for membership is limited to juniors in the upper fifth of the industrial engineering class, and to seniors in the upper third, together with demonstrated qualities of leadership, ethicality, sociability, and breadth of interest.

**Alpha Zeta.** This is the oldest national agricultural honor fraternity in the country. Election to membership usually is limited to junior and senior students in agriculture who have achieved outstanding records of scholarship, character, and leadership in their chosen fields.

**Chi Epsilon.** Civil engineering students may be elected by the present membership to this national honorary scholastic fraternity. It is open to junior and senior students who have a scholastic rank in the upper one-third of their class with an appropriate grade point ratio as defined in the membership requirements of the society.

**Eta Kappa Nu.** Electrical engineering majors are eligible for membership in this national honor society. It is open to junior students in the top one-fourth of their class and to senior students in the top one-third of their class.

**Iota Lambda Sigma.** This fraternity is a national society open to all industrial education majors. Students are required to have an over-all grade point average of 1.50, and of 2.00 in industrial education courses for membership. Its objectives are to encourage and develop scholarship, leadership, and a professional pride among the industrial education students.

**Phi Eta Sigma.** A student who, during his first freshman semester in the University, carried an academic load of at least 13 semester hours and attained a grade point ratio of 2.50 or better is eligible for membership in the Texas A&M Chapter of this national freshman scholastic fraternity. One not meeting these requirements at the end of the first semester but who attains an average grade point ratio of 2.50 or better for the first two semesters is eligible.

**Phi Kappa Phi.** Open to all academic fields in the undergraduate colleges, this honor society elects its membership from those students who are within a year of graduation in a four-year course and are within the top one-tenth of their class scholastically. The student must have been registered one year in the University to be eligible. Graduate students with outstanding records who have satisfied the residence requirement are also eligible for membership.

**Phi Lambda Upsilon.** This is the oldest national chemical honor fraternity in the country. Election to membership is limited to junior, senior, and graduate students in chemistry and chemical engineering who have achieved outstanding records of scholarship, character, and leadership in their chosen fields.

**Phi Zeta.** Students in the College of Veterinary Medicine who rank in the upper ten per cent of the second year class or upper twenty-five per cent of the third year class and who have a grade point ratio of at least 2.25 in their entire veterinary curriculum through the preceding trimester are eligible for election to this honor society.

**Pi Tau Sigma.** From mechanical engineering students in the top quarter of their junior class and top third of their senior class, there may be elected to this national mechanical engineering fraternity those whose high character and whose specific grades meet the requirements of the local chapter.

**Sigma Delta Chi.** This is the national professional journalistic society for men in journalism. Membership is by election. Journalism majors are eligible for consideration after they have completed the first semester of their sophomore year. Candidates must have an above average scholastic rating and must have demonstrated a desire to practice journalism as a life profession.

**Sigma Gamma Tau.** Aerospace engineering students may be elected by the present membership to this national honorary scholastic fraternity. The minimum grade point ratio is 2.00 for eligibility for this society.

**Sigma Pi Sigma.** Students elected to membership in this national physics honor society must attain high standards of scholarship, outstanding achievement in physics, and promise of professional merit. A minimum grade point average of 2.00 and a grade of B or better in an advanced physics course is required for eligibility.

**Sigma Tau Delta.** This national English professional fraternity is open to junior, senior, and graduate English majors who have distinguished themselves in scholarship, leadership, and character. Those elected to membership must have a grade point average of 1.65 over-all and of 2.00 in English courses after three full semesters of college level work.

**Sigma Xi.** The object of this society is to encourage original investigation in science, pure and applied. It is open to graduate students and to staff members of the Texas A&M University System who have shown a marked excellence in one or more departments of pure or applied science and given evidence of an aptitude for scientific research.

**Tau Beta Pi.** Students in the College of Engineering who rank in the top one-eighth of the junior class or top one-tenth of the senior class are eligible for election to this society. This is the oldest national engineering society founded for the purpose of recognizing scholarship.



## SCHOLASTIC PROBATION

Whenever a student's cumulative record indicates that he is failing to make satisfactory progress, he is considered as scholastically deficient. The cause of the deficiency will be investigated by the dean of his college, and the student may be placed on scholastic probation of such terms as the dean shall designate, or he may be required to withdraw from the University if the deficiency warrants.

Scholastic probation is a conditional permission for a student to continue in school after he has become scholastically deficient or after he has incurred an excessive number of unauthorized absences. This permission is granted by the dean of the student's college when an analysis of the deficiency indicates that a continuation is in the best interests of the student and the University.

## CLASSIFICATION

Sophomore, junior, and senior classification will be granted on completion of 30, 60, and 95 semester hours respectively.

## EXCESS HOURS

A student may register for the regular semester program in his curriculum if he is in good standing. With the dean's approval, necessary adjustments for minor irregularities may be authorized up to 20 hours. Registration for 21 hours or more may be approved under the following conditions:

Hours	Grade Point Ratio Last Semester or Overall
21	1.50
22	2.00
23	2.25
24	2.50

The normal amount of work a student may carry in a six-week summer term is 6 semester hours (or 7 if part is practice). Hours in excess of a normal load may be authorized in certain cases by the student's dean in conformance with the limitations that apply during the academic year. For the entire summer session the maximum number permissible is 15 semester hours.

## PREPARATION FOR TEACHING

Teacher education is an important part of the university curriculum, so much that it is a university-wide enterprise. The Council on Teacher Education, an administrative body, comprised of representatives from all colleges and departments engaged in teacher education, gives general direction to the institutional program. All of the teacher preparation programs are fully certified and meet the standards set forth by the State of Texas and the Texas Education Agency.

Students who decide on a career in teacher education will find the field offers many challenging opportunities for advancement. The good teacher should possess a keen desire to work understandingly with youths, their parents, and his professional associates.

A student may prepare for teaching by selecting a program in one of four departments of the University. These are the Department of Agricultural Education in the College of Agriculture; the Department of Education and Psychology and the Department of Health and Physical Education, both in the College of Arts and Sciences; and the Department of Industrial Education in the College of Engineering.

The student may choose teaching fields from among those listed below:

Agricultural Education

Biology

Business

Chemistry

Driver Education

English

General Science

Geography

Government

Health and Physical Education

History

Industrial Arts Education

Industrial Vocational Education

Journalism

Mathematics

Physics

Social Studies

Spanish

An approved graduate program is available to those who wish to do additional work in either the Departments of Agricultural Education, Education and Psychology, Health and Physical Education, and Industrial Education. Professional programs are approved for certification of superintendents, principals, supervisors, counselors, visiting teachers, and master teachers within subject-matter areas.

The Placement Office of the University endeavors to assist graduates and students of the University in securing suitable teaching positions and to assist boards of education and other officials in securing teachers. The Placement Office makes every effort to place candidates who register for the service in good positions. Information obtained from professors and others is confidential. No charge is made for this service.

### **Agricultural Education**

Training provided in Agricultural Education prepares the prospective teacher to operate a program of vocational agriculture as an integral part of the high school educational system. Agricultural education majors also qualify for a second teaching field in biology. The curriculum in agricultural education provides a well-rounded education in areas involving teacher-student and teacher-community relationships, science, technical agriculture, and general education.

Courses involving teacher-student and teacher-community relationships offered in the agricultural education curriculum are educational psychology, secondary school curriculum, principles of agricultural education, course building for in-school youth, Future Farmer and Young Farmer activities, adult education, methods of developing supervised farming programs, student teaching in vocational agriculture, and agricultural journalism. These courses are designed to develop basic educational philosophies, methods of selecting problems to be taught, and methods of teaching in-school youth, young farmers, and adult farmers.

A minimum of 54 semester hours in technical agriculture is required for agricultural education graduates. This provides an opportunity for the graduate to have a knowledge of the technical agriculture that is essential for successfully teaching vocational agriculture. Master of Education and Master of Science degrees are also available with majors in agricultural education.

General education receives emphasis in the agricultural education curriculum. This includes courses in English, history, government, mathematics and economics. Thirty semester hours of science are included in the agricultural education curriculum. This training prepares the prospective high school teacher of vocational agriculture to operate an efficient educational program in agriculture. Since this educational program includes both high school students and adult farmers, the prospective teacher must be technically and professionally competent.

### **Education and Psychology**

The Department of Education and Psychology coordinates the programs of teacher preparation in the academic areas commonly taught in the high school and the elementary school. Areas of specialization may be obtained in biology, business, chemistry, English, general science, geography, government, health and physical education, history, journalism, mathematics, physics, and Spanish.

Students may choose to major in the Department of Education and Psychology or in the University department representing their subject-matter specialty. In either case the student planning to teach in high school must complete a 24-hour sequence in each of two teaching fields, or he must select a 48-hour approved program in either general science or social studies. In addition 18 hours of courses in education and psychology will be required for certification. Majors in the department itself will take 12 additional hours in professional development and will follow the four-year program outlined in the section of this catalogue devoted to the College of Arts and Sciences.

Students planning to teach in the elementary school must select an 18-hour approved sequence in a single subject-matter field and 18 hours in approved courses related to the elementary school curriculum. An additional 30-hour sequence in education and psychology is required. Majors in the Department will take 11 additional hours of approved courses and will follow the four-year program outlined in the section of this catalogue devoted to the College of Arts and Sciences.

The Department offers graduate programs leading to the degrees of Education, Master of Science, or Doctor of Philosophy. These programs prepare students for

professional certification as master teachers or as superintendents, principals, supervisors, counselors, or visiting teachers. Certification at the professional level requires three years of teaching experience in addition to graduate level training.

### **Health and Physical Education**

The Department of Health and Physical Education offers a major for those students, both men and women, who are interested in a career as a: (1) teacher of health and physical education in either secondary or elementary school; (2) coach of athletics; or (3) as an athletic trainer. Students completing the teacher education program in Health and Physical Education will be eligible for a secondary teaching certificate and an all-grade-level certificate in health and physical education.

The Department also offers graduate study leading to the Master of Education degree and to the Professional Certificate in Health and Physical Education.

### **Industrial Education**

The Department of Industrial Education offers two options in teacher preparation leading to the Bachelor of Science degree in industrial education. Qualified students may pursue any of the courses of study described below with reasonable assurance of being able to secure a position in the field for which they have prepared. Master of Education, Master of Science, and Doctor of Education degrees are also available with majors in industrial education.

#### **Industrial Arts Education**

Graduates of this curriculum may become industrial arts teachers in the junior and senior high schools of the State. (Industrial arts in these schools includes general shop, electrical work, woodwork, technical drawing, plastics, ceramics, leather, and other craft courses.) The industrialization of the Southwest has created many outstanding opportunities for the prospective industrial arts teacher.

#### **Vocational Industrial Education**

The vocational industrial teacher education option in the industrial education curriculum is intended for teachers, supervisors, and directors for the vocational industrial schools and classes of Texas. Since the men completing this course are to qualify as teachers under the State Plan for Vocational Education, a candidate for a degree must satisfy the requirements for one of the classes of vocational teachers as specified in the State Plan. The Head of the Department of Industrial Education will assist the student in the preparation of his degree plan.

## **COUNSELING AND GUIDANCE SERVICE**

### **Purposes**

The Counseling and Testing Center provides testing, counseling, and guidance services to students and related consultative services to the faculty and staff.

### **Counseling**

Limited specialized counseling of students is the responsibility of the Counseling and Testing Center. At the Center is a staff of competent and well trained men who are available to work with students. A student may request help of the Counseling and Testing Center, or he may be referred by a proper representative of the University, a parent, or other interested persons.

The student will find at the Center professional, sympathetic persons with whom he can discuss in confidence a personal problem, a vocational problem, or an educational problem.

The counselor may call upon the resources of the University (departmental advisors, student loan agencies, the University Hospital, etc.) to help the student in making an effective adjustment to his problem. The counselor is a person who understands the complex organization of the University, the requirements, the different curricula. In short, it is a part of the counselor's job to know the various resources available and to refer the student to them.



## Guidance

The Center provides consulting services and in some instances short periods of training to the University family on problems related to study, University orientation, and vocational guidance.

## Vocational Reading Room

The Counseling and Testing Center provides a Vocational Reading Room to students who are investigating vocations.

## Remedial Services

To the limit of time and personnel the Center will work with individuals on problems of reading and study.

## Testing Services

Texas A&M University requires three College Entrance Examination Board tests as a part of its admission procedure for all applicants seeking admission to their first semester of college or university work. Results of these tests are to be used for admission, counseling, and placement purposes. The following tests are required:

Scholastic Aptitude Test (SAT)  
English Composition Achievement Test  
Mathematics Test, Level I (Standard)  
Or  
Mathematics Test, Level II (Intensive)

The College Entrance Examination Board offers these examinations at conveniently located testing centers throughout the United States and in major cities of many foreign countries. Information regarding testing dates, location of testing centers, fees required and test registration instructions may be obtained by writing to the College Entrance Examination Board, Box 592, Princeton, New Jersey. This same information may also be obtained from most high school counselors. It is the applicant's responsibility to make arrangements for taking the examinations. Arrangements are to be made directly with the College Board, not through Texas A&M University.

The University will accept scores on either the Mathematics Test, Level I (Standard) or the Mathematics Test, Level II (Intensive). However, most students will be expected to take the Mathematics Test, Level I (Standard). Students interested in taking the Mathematics Test, Level II (Intensive), should do so only after careful study of the College Entrance Examination Board publication, "Achievement Tests," and a conference with the high school counselor or Mathematics teacher.

Several two day conferences will be conducted during the summer months on the campus of Texas A&M University for all applicants who have qualified for admission to the fall semester as beginning freshmen. At these counseling sessions, the CEEB test scores will be interpreted to each student, and additional tests in chemistry, reading, and other areas will be administered. Although the student bears the expense of the CEEB tests, there is no charge other than for meals and overnight accommodations for the testing and counseling conferences on the campus during the summer months. Following the student's acceptance into the University by the Director of Admissions, the Counseling and Testing Center will write to him concerning these summer counseling conferences.

All inquiries concerning admission should be addressed to the Director of Admissions, Texas A&M University, College Station, Texas, 77843.

## The Texas A&M Adjunct

The Texas A&M Adjunct is a summer school with a camp atmosphere for students entering college for the first time. The University has developed a beautiful campsite of 411 acres on the South Llano River in the heart of the Texas Hill Country, about one mile from Junction, Texas. Two six week terms are offered each summer.

A well rounded program for each student includes classwork, study, and recreation. The student takes seven hours of regular college work, usually college English, college mathematics and physical education. Teachers and counselors are available to help the student with problems that may arise.

At the first of each term every student is given a supplementary group of tests. This group consists of achievement and interest tests which, with the CEEB scores, aid the counselor in helping the student decide upon his course of study for the summer term and his future course of study to follow in the University.

An organized inter-cabin competitive intramural program is offered. Also, swimming, canoeing, and fishing activities are conducted in the cool, clear water of the South Llano River. An outdoor amphitheater is available for variety shows and group meetings.

The Texas A&M Adjunct is administered by the Counseling and Testing Center through the Dean of Instruction. In almost every case staff members come from the regular faculty of the Texas A&M University. The Center works closely with the departments who offer courses in the instructional programs.

# *The College of Agriculture*

The various curricula in the College of Agriculture have as their main objective the preparation of young men for farming, ranching, and other businesses associated with agriculture; for harvesting, processing, and marketing of food and fiber products; for the pursuit of scientific investigation in the broad field of agriculture, including soils, water and plant and animal products, both native and cultivated; for careers in teaching or extension work in agriculture; for work with various governmental and private agricultural agencies; or for the teaching of conservation and management of our natural and cultivated resources. Systematic training is given in the sciences of chemistry, physics, mathematics, and biology, all of which are fundamental to the study of scientific agriculture. The curricula offered give the student a wide range of choice in the selection of a major, and elective courses provide excellent opportunity for enlarging his field of learning in keeping with his individual interest and needs.

## **CURRICULA**

### **Agricultural Economics**

Agricultural Administration Option

Farm Management Option

### **Agricultural Education**

### **Agricultural Engineering**

### **Agricultural Journalism**

### **Animal Science**

Commercial Option

Production Option

### **Dairy Science**

Manufacturing Option

Production Option

### **Entomology**

### **Food Technology**

### **\*Forestry**

Poultry Science

Range Science

Sociology

Human Relations Option

Rural Leadership Option

Soil and Crop Sciences

Agronomy

Floriculture

Horticulture

Plant and Soil Science

Wildlife Science

Fisheries Option

\*The present curriculum includes the first two years of forestry only.

A School of Natural Bio-Sciences within the College of Agriculture has been approved and will begin operation in the fall of 1965. This school includes the Departments of Range Science, Wildlife Science, and Recreation and Parks. The Department of Recreation and Parks is new and a curriculum is being developed as this catalogue goes to press. Please refer to the Office of Agricultural Instruction, 216 Herman Heep Building, for information on this curriculum.

## **Curricula in AGRICULTURAL ECONOMICS**

Trained personnel are needed in agricultural economics in the fields of marketing and price analysis, farm and ranch management, resource economics, agricultural policy, and finance and consumer economics.

### **Agricultural Administration Option**

The program in agricultural administration prepares students for employment with governmental and private agencies; in such positions as research workers, marketing specialists, agricultural agents of banks and business firms; as extension workers; and as salesmen and teachers. Electives in business administration prepare students for work in businesses related to agriculture. Electives in technical agriculture prepare a student who wishes to become a specialist in the marketing of a particular farm product.



## FRESHMAN YEAR

First Semester		Credit	Second Semester		Credit
Ag.Ec. 105	Intr. to Agr. Economics	3	An.Sc. 107	Gen. Animal Science	3
Biol. 107	Vertebrate Zoology	3	Biol. 101	Gen. Bot. of Seed Plants	3
Chem. 101	Gen. Chemistry	4	Chem. 102	Gen. Chemistry	4
Engl. 103	Composition & Rhetoric	3	Engl. 104	Composition & Rhetoric	3
Math. 102	Algebra	3	Math. 110	Survey in Math.	3
M.S. or A.S.		1	M.S. or A.S.		1
P.E. 101		R	Elective		R
		17	P.E. 102		1
					18

## SOPHOMORE YEAR

Agro. 105	Fund. of Crop. Prod.	3	Ag.Ec. 314	Mktg. Agricultural Products	3
B.A. 227	Prin. of Accounting	4	B.A. 228	Prin. of Accounting	4
D.S. 202	Dairying	3	Econ. 204	Prin. of Economics	3
Or			Engl. 210	Intr. to Logical Discourse	3
P.S. 201	Poultry Production	3	Hort. 201	Gen. Horticulture	3
Econ. 203	Prin. of Economics	3	M.S. or A.S.		1
Engl. 203	Intr. to Literature	3	Elective		1
M.S. or A.S.		1	P.E. 202		R
Elective		1			1
P.E. 201		R			18
		18			

## JUNIOR YEAR

Ag.Ec. 413	Agricultural Cooperatives	3	Ag.Ec. 325	Prin. of Farm & Ranch Mgmt.	
Agro. 301	Soil Science	4	Or		
B.A. 303	Statistical Method	4	Ag.Ec. 452	Intl. Trade & Agriculture	3
Econ. 323	Economic Analysis	3	Ag.Ec. 422	Land Economics	3
Elective		4	Econ. 311	Money & Banking	3
		—	Govt. 206	American Natl. Govt.	3
		18	Hist. 325	Trends in Amer. Hist.	3
			Elective		3
					18

## SENIOR YEAR

Ag.Ec. 447	Agricultural Prices	3	Ag.Ec. 429	Agricultural Policy	3
Ag.Ec. 481	Seminar	1	Ag.Ec. 430	Agricultural Finance	3
Engl. 301	Writing for Prof. Men	3	Soc. 407	Human Relations in Agr.	3
Hist. 326	Hist. of Texas	3	Spch. 403	Public Speaking	3
Elective		8	Elective		6
		18			18

NOTE: Electives shall be chosen and approved according to the following policy:

1. **AGRICULTURAL BUSINESS ADMINISTRATION:** Students preparing for work with business concerns allied with agriculture should elect from 9 to 18 hours in business administration and economics.
2. **AGRICULTURAL MARKETING:** Students preparing for work in agricultural marketing should elect from 9 to 18 hours in courses dealing with the production, grading, and marketing of commodities.
3. **AGRICULTURAL ECONOMICS:** Students preparing for professional work in agricultural economics and expecting to take graduate training should elect courses in the various social sciences, including advanced economic theory.

## Farm Management Option

The program in farm management prepares students for the operation of farms and ranches and for professional and commercial work dealing with agriculture. Electives in technical agriculture permit students to emphasize the study of particular agricultural enterprises.

## FRESHMAN YEAR

First Semester		Credit	Second Semester		Credit
Ag.Ec. 105	Intr. to Agri. Economics	3	Agro. 105	Fund. of Crop Production	3
Biol. 107	Vertebrate Zoology	3	Biol. 101	Gen. Botany of Seed Plants	3
Chem. 101	Gen. Chemistry	4	Chem. 102	Gen. Chemistry	4
Engl. 103	Composition & Rhetoric	3	Engl. 104	Composition & Rhetoric	3
Math. 102	Algebra	3	Math. 110	Survey in Math.	3
M.S. or A.S.		1	M.S. or A.S.		1
P.E. 101		R	Elective		1
		17	P.E. 102		R
					18

## SOPHOMORE YEAR

An.Sc. 107	Gen. Animal Science	3	Ag.Ec. 314	Mktg. Agricul. Products	3
Chem. 231	Elem. Organic Chemistry	3	Ag.En. 201	Farm Power & Mach.	3
D.S. 202	Dairying	3	Econ. 204	Prin. of Economics	3
Or			Engl. 210	Intr. to Logical Discourse	3
P.S. 201	Poultry Production	3	Hort. 201	Gen. Horticulture	3
Econ. 203	Prin. of Economics	3	M.S. or A.S.		1
Engl. 203	Intr. to Literature	3	Elective		1
Ento. 201	Gen. Entomology	3	P.E. 202		R
M.S. or A.S.		1			17
P.E. 201		R			
		19			

## JUNIOR YEAR

Ag.Ec. 321	Farm & Ranch Records	3	Ag.Ec. 325	Prin. of Farm & Ranch Mgmt.	3
Agro. 301	Soil Science	4	An.Sc. 303	Animal Nutrition	3
Econ. 323	Economic Analysis	3	B.A. 303	Statistical Method	4
Gen. 301	Genetics	4	Phys. 213	Phys. for Agr. Students	3
Soc. 205	Prin. of Sociology	3	Elective		5
Elective		1			18
		18			

## SENIOR YEAR

Ag.Ec. 432	Farm & Ranch Appraisal	3	Ag.Ec. 429	Agricultural Policy	3
Ag.Ec. 447	Agricultural Prices	3	Govt. 206	American National Govt.	3
Ag.Ec. 481	Seminar	1	Hist. 326	Hist. of Texas	3
Hist. 325	Trends in Amer. Hist.	3	Spch. 403	Public Speaking	3
Jour. 415	Agr. Journalism	3	Elective		6
Elective		5			18
		18			

NOTE: Electives shall be chosen and approved according to the following policy:

1. Not more than 9 elective hours of advanced courses in agricultural economics will be permitted toward requirements for graduation.
2. Other electives shall be selected to strengthen the student's preparation for farm operation and closely related agencies and businesses.

### Curriculum in AGRICULTURAL EDUCATION

This curriculum, which includes well balanced selections in various areas of technical agriculture, is designed to give the teacher of vocational agriculture the preparation and training in both technical agriculture and professional education, including student teaching, required for teacher certification under the Texas Education Agency State Plan for Vocational Education. Students also qualify for the biology teaching certificate.

In addition to being certified to teach vocational agriculture, graduates of this curriculum find employment with the agricultural extension service and the soil conservation service, in agricultural public relations work with banks and other agencies, with chambers of commerce and news gathering and reporting agencies, and with industries related to agriculture.

## FRESHMAN YEAR

First Semester		Credit	Second Semester		Credit
An.Sc. 107	Gen. Animal Science		Agro. 105	Fund. of Crop Production	
Or			Or		
P.S. 201	Poultry Production	3	Hort. 201	Gen. Horticulture	3
Biol. 101	Gen. Botany of Seed Plants	3	Biol. 107	Vertebrate Zoology	3
Engl. 103	Composition & Rhetoric	3	Chem. 101	Gen. Chemistry	4
Hist. 105	Hist. of United States	3	Engl. 104	Composition & Rhetoric	3
Math. 102	Algebra	3	Hist. 106	Hist. of United States	3
M.S. or A.S.		1	M.S. or A.S.		1
P.E. 101		R	P.E. 102		R
		16			17

## SOPHOMORE YEAR

Ag.En. 221	Farm Shop	2	Ag.En. 201	Farm Power & Mach.	
Chem. 102	Gen. Chemistry	4	Or		
Econ. 203	Prin. of Economics	3	Ag.En. 325	Farm Electricity	3
Ento. 201	Gen. Entomology	3	Ag.En. 222	Farm Shop	2
Or			Chem. 231	Elem. Organic Chemistry	3
Ento. 313	Biology of Insects	3	D.S. 202	Dairying	3
Govt. 206	American National Govt.	3	Govt. 207	State and Local Govt.	3
Jour. 201 <sup>1</sup>	News Writing	3	M.S. or A.S.		1
M.S. or A.S.		1	Elective (Physical Science <sup>2</sup> )		3
P.E. 201		R	P.E. 202		R
		19			18

## JUNIOR YEAR

Ag.Ec. 314	Mktg. Agricultural Prod.	3	Ag.Ec. 325	Prin. of Farm & Ranch Mgmt.	3
Ag.Ed. 301	Intr. to Agricul. Educ.	2	Agro. 318	Soil Conservation	4
Agro. 301	Soil Science	4	Gen. 301	Genetics	4
An.Sc. 303	Animal Nutrition	3	Psy. 301	Educational Psychology	3
Elective (Animal Science <sup>3</sup> )		3	Elective (Plant Science <sup>5</sup> )		3
Elective (Plant Science <sup>4</sup> )		3			17
		18			

## SENIOR YEAR

Ag.Ed. 425	Course Building	2	Ag.Fd. 427	Meth. of Devel. Farm Programs	2
Ag.En. 335	Water Control & Utiliz.	3	Ag.Fd. 436 <sup>7</sup>	Student Tchg. in Ag.Ed.	6
Educ. 444	Sec. School Curriculum	3	An.Sc. 416	Livestock Mgmt.	2
Jour. 415 <sup>1</sup>	Agricul. Journalism	3	D.S. 420	Dairy Mgmt.	2
Elective <sup>6</sup>		3	P.S. 401	Mgmt. & Selection	2
Elective		1	Elective		2
		15			16

NOTES: 1. A course in English may be elected in place of this course.

2. The physical science elective is to be selected from: Geol. 205; Math. 103, 104, 110; Phys. 213.

3. This animal science elective is to be selected from: An.Sc. 306, 433; Ento. 301; W.S. 401, 403.

4. This plant science elective is to be selected from: Agro. 304; Biol. 102, 206, 327, 353, 453; P.P.P. 313; R.S. 303, 316.

5. This plant science elective is to be selected from: Agro. 308; P.P.P. 301; R.S. 401.

6. This elective is to be selected from: Ag.Ec. 321, 413, 429, 452; Ag.Ed. 441; B.A. 211; Geog. 204, 401; Hist. 318; Soc. 404, 407.

7. The laboratory hours in Ag.Ed. 436 will include one-half semester of off-campus student teaching.

### Curriculum in AGRICULTURAL ENGINEERING

The curriculum in agricultural engineering is under the joint supervision of the College of Agriculture and the College of Engineering. Agricultural engineering deals with the application of the fundamental branches of engineering to the peculiar conditions and requirements of agriculture as an industry and as a field of applied science. The term "agricultural engineer" denotes an engineer who has been trained in both engineering and agriculture, with experience in combining the two, and who



is qualified to develop, design, organize, and direct engineering work in agriculture and closely allied industries.

In general, agricultural engineering may be broken down into five major phases of activity: power and machinery; agricultural structures design; farm electrification; agricultural process engineering; and soil and water control and conservation, which includes drainage, flood control, irrigation, and soil erosion control.

Graduates of this curriculum are prepared for service in teaching, extension, and research work; with government soil and water control projects; with manufacturers of farm equipment in advertising, sales, and design work; with engineering and contracting firms; with agricultural processing industries; and with building and equipment manufacturers.

Students who expect to enter the agricultural engineering curriculum and are not thoroughly grounded in the fundamentals of algebra and trigonometry are urged to attend a six-week term of summer school prior to the fall semester of the freshman year and take courses in algebra and trigonometry equivalent to Mathematics 102 and 103 at Texas A&M University. Those students who enter the fall semester's work not prepared to take Mathematics 121 should replace Mathematics 121 and History 105 in their fall schedule with Mathematics 102 and 103. Before the end of the fall semester, these students should contact the Head of the Department of Agricultural Engineering for specific instructions and a degree plan.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
E.G. 105 Engr. Graphics	2	E.G. 106 Descriptive Geom.	2
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of the United States	3	Math. 122 Calculus	4
Math. 121 Anal. Geom. & Calculus	4	M.S. or A.S.	1
M.S. or A.S.	1	Phys. 218 Mechanics & Heat	4
P.E. 101	R	P.E. 102	R
	17		18

### SOPHOMORE YEAR

Agro. 105 Fund. of Crop Prod.	3	Ag.En. 208 Farm Machinery	3
H.st. 106 Hist. of United States	3	C.E. 201 Plane Surveying	4
Math. 307 Calculus	3	C.E. 305 Mech. of Materials	3
M.E. 212 Engr. Mechanics	3	Econ. 203 Prin. of Economics	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	17		18

### JUNIOR YEAR

Ag.En. 301 Agr. Structures Des.	3	Ag.En. 324 Agr. Engine & Trac. Des.	3
E.E. 305 Elec. Circuits & Mach.	4	Agro. 301 Soil Science	4
E-gl. 203 Intr. to Literature	3	C.E. 311 Hydraulics	3
Govt. 206 American National Govt.	3	C.E. 336 Hydraulics Lab.	1
M.E. 323 Thermodynamics	4	M.E. 313 Engr. Mechanics	3
	17	Elective	3
			17

### SENIOR YEAR

Ag.En. 418 Agr. Process Engr.	3	Ag.En. 410 Irrig. & Drain. Engr.	3
Ag.En. 428 Soil & Water Conserv. Engr.	3	Ag.En. 413 Agr. Structures Des.	3
Ag.En. 481 Seminar	1	Ag.En. 430 Farm Electrification	3
Agro. 445 Soil Physics	3	Ag.En. 482 Seminar	1
Elective	7	Engl. 301 Writing for Prof. Men	3
	17	Elective	3
			16

## Curriculum in AGRICULTURAL JOURNALISM

The curriculum in agricultural journalism is designed to prepare students for professional careers as agricultural writers and editors, including work on bulletins and magazines as well as on rural and metropolitan newspapers, and in radio-TV broadcasting.

The first two years are planned to give students the fundamental studies. The program gives students an adequate background for general journalistic work and affords them opportunities to prepare themselves as specialists in certain phases of agricultural writing.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Agro. 105 Fund. of Crop Prod.	3	An.Sc. 107 Gen. Animal Science	3
Biol. 107 Vertebrate Zoology	3	Biol. 101 Gen. Bot. of Seed Plants	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	Jour. 102 Commun. Media & Prin.	2
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	R.S. 102 Intr. to Range & For.	1
	17	P.E. 102	R
			17

### SOPHOMORE YEAR

Chem. 231 Elem. Organic Chem.	3	Ag.En. 201 Farm Power & Mach.	3
D.S. 202 Dairying	3	Biol. 206 Intr. Microbiology	3
Engl. 212 Shakespeare		Econ. 203 Prin. of Economics	3
Or		Hort. 201 Gen. Horticulture	3
Engl. 231 or 232 Surv. of Engl. Lit.	3	Jour. 202 Beg. News Reporting	3
Ento. 201 Gen. Entomology	3	M.S. or A.S.	1
Jour. 201 News Writing	3	P.E. 202	R
M.S. or A.S.	1		—
P.S. 201 Poultry Prod.	3		16
P.E. 201	R		
	19		

### JUNIOR YEAR

Agro. 301 Soil Science	4	Ag.Ec. 314 Mktg. Agr. Products	3
Gen. 301 Genetics	4	An.Sc. 303 Animal Nutrition	3
Govt. 206 American National Govt.	3	Jour. 311 Radio & TV News Writ.	3
Jour. 307 News Editing	3	Jour. 315 Photography	2
Phys. 213 Phys. for Agr. Students	3	Elective*	6
	17		17

### SENIOR YEAR

Hist. 325 Trends in Amer. Hist.	3	Ag.Ec. 429 Agr. Policy	3
Jour. 304 Feature Story Writing	3	Hist. 326 Hist. of Texas	3
Jour. 308 Newspaper Advertising	3	Jour. 410 Publ. Prod. & Graph. Arts	3
Spch. 403 Public Speaking	3	Soc. 407 Human Rel. in Agr.	3
Elective*	5	Elective*	5
	17		17

\*NOTE: Electives shall be selected and substitutions made with the advice of the Head of the Department. Econ. 323 and courses in sociology, plant pathology, plant physiology, wildlife science, and soil conservation are recommended electives.

## Curricula in ANIMAL SCIENCE

The curricula in animal science are designed to prepare students for careers in private and public businesses dealing primarily with the production of livestock and processing of livestock products. Research in nutrition, breeding, reproductive physiology, meats, wool and mohair, production, and management coupled with extensive laboratory facilities and livestock operations on and near campus result in courses being taught on a fully scientific basis designed for practical application.

Either curriculum option is a suitable foundation for graduate study if elective courses are properly chosen. However, the science curriculum is planned especially for students preparing for graduate study.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
An.Sc. 107 <sup>1</sup> Gen. Animal Science	3	Biol. 101 Gen. Bot. of Seed Plants	3
Biol. 107 Vertebrate Zoology	3	Biol. 108 Invert. Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	—		—
	17		17

### SOPHOMORE YEAR

Biol. 206 Intr. Microbiology	3	Chem. 228 Organic Chemistry	4
Chem. 227 Organic Chemistry	4	Engl. 231 or 232 Surv. of Engl. Lit.	3
Math. 104 Analytic Geometry	3	Math. 209 Calculus	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 201 College Physics	4	Phys. 202 College Physics	4
Elective <sup>2</sup>	3	Elective	3
P.E. 201	R	P.E. 202	R
	—		—
	18		18

### JUNIOR YEAR

Biol. 217 Comp. Anat. of Vert.		Agro. 301 Soil Science	4
Or		Biol. 344 Embryology	3
Biol. 343 Histology	3	Econ. 203 Prin. of Economics	3
Chem. 316 Quantitative Analysis	2	Engl. 301 Writing for Prof. Men	3
Chem. 319 Quant. Anal. Lab.	2	Elective	4
Gen. 301 Genetics	4		—
Hist. 325 Trends in Amer. Hist.	3		17
Elective	3		—
	—		—
	17		17

### SENIOR YEAR

B.N. 410 <sup>3</sup> Intr. Biochemistry	4	Govt. 206 American National Govt.	3
Biol. 433 Gen. Physiology	4	Hist. 326 Hist. of Texas	3
Stat. 406 Statistical Methods	3	Spch. 403 Public Speaking	3
Elective	6	Elective	8
	—		—
	17		17

NOTES: 1. D.S. 202 or P.S. 201 may be substituted.

2. Ento. 201 or 208 or Chem. 226 is recommended.

3. An.Sc. 303 plus 1 hour of elective, or P.S. 411, may be substituted.

4. The student planning further study in animal science, biochemistry and nutrition, dairy science, genetics, or poultry science should select suitable elective courses with the advice of the head of the appropriate department.



### Production Option

The production option prepares students to be ranch managers; livestock buyers; livestock association representatives; county agricultural agents; and for related livestock enterprises. Courses in addition to basic animal science include agronomy, range management, genetics, and veterinary medicine. Elective courses are selected by the student with the aid of the departmental advisors.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
An.Sc. 107 Gen. Animal Science	3	Agro. 105 Funds. of Crop Production	3
Biol. 107 Vertebrate Zoology	3	Biol. 101 Gen. Botany of Seed Plants	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	Hist. 105 Hist. of United States	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	17		17

### SOPHOMORE YEAR

B.A. 227 Prin. of Accounting	4	Econ. 203 Prin. of Economics	3
Chem. 232 Elem. Organic Chemistry	5	Engl. 203 Introd. to Literature	3
Ento. 208 Veterinary Entomology	3	Or	
M.S. or A.S.	1	Engl. 210 Introd. to Logical Discourse	3
Stat. 201 Elem. Statistical Inference	3	Hist. 106 Hist. of United States	3
P.E. 201	R	M.S. or A.S.	1
	16	Phys. 213 Phys. for Agr. Students	3
		V.A. 202 Veterinary Anatomy	3
		P.E. 202	R
			16

### JUNIOR YEAR

An.Sc. 303 Animal Nutrition	3	Agro. 301 Soil Science	4
An.Sc. 307 Meats	3	An.Sc. 306 Animal Breeding	3
An.Sc. 433 Reprod. in Farm Animals	3	An.Sc. 309 Feeds and Feeding	3
Gen. 301 Genetics	4	An.Sc. (Prod. elective)	3 or 4
V.Mi. 301 Microorganisms in Animal Dis.	3	V.P.P. 323 Physiol. of Farm Animals	3
Elective	2	Elective	2 or 1
	18		18

### SENIOR YEAR

Agro. 308 Forage Crops		Ag.Ec. (elective)	3
Or		An.Sc. 437 Mktg. & Grad. Livestock & Meats	3
R.S. 314 Prin. of Range Mgmt.	3	An.Sc. 481 Seminar	1
An.Sc. (elective)	3	Spch. 403 Public Speaking	3
Engl. 301 Writing for Prof. Men	3	V.Par. 487 Parasites of Farm Animals	3
Govt. 206 American Natl. Govt.	3	Elective	4
Elective	5		17
	17		

### Commercial Option

The commercial option prepares the students for positions in the meat packing, feed, and livestock pharmaceutical industries; in livestock marketing; and in related agricultural interests. Courses in accounting, personnel management, business law, and psychology, in addition to the basic animal science courses, orient this option particularly toward the commercial livestock field. A number of graduates have obtained desirable positions as livestock representatives for banks, insurance companies, and other loan companies. Elective courses are selected by the student with the aid of the departmental advisors.

(Same as Production Option except that students substitute B.A. 211, B.A. 422, and Psy. 303 for Agro. 308 or R.S. 314, V.Par. 487, and V.P.P. 323.)

## Curricula in DAIRY SCIENCE

Trained personnel are much in demand to aid, service, manage, and direct the production, manufacture, and distribution of milk and dairy foods.

### Dairy Manufacturing Option

This major is designed to prepare students for careers in dairy plant operation and management; plant field work and dairy product quality control; teaching and research work in milk and dairy food processing; merchandising and sales. Fundamental technical and business courses offer a well rounded program of training in these areas.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Agro. 105 Fund. of Crop Prod.	3	An.Sc. 107 Gen. Animal Science	3
Biol. 107 Vertebrate Zoology	3	Biol. 101 Gen. Bot. of Seed Plants	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	M.S. or A.S.	1
M.S. or A.S.	1	P.S. 201 <sup>1</sup> Poultry Prod.	3
P.E. 101	R	Elective	1
	—	P.E. 102	R
	17		—
			18

### SOPHOMORE YEAR

Chem. 223 Elem. Quant. Analysis	3	Ag.En. 213 Food Plant Engr.	3
D.S. 202 Dairying	3	Biol. 206 Intr. Microbiology	3
Engl. 210 Intr. to Logical Disc.	3	Chem. 231 Elem. Organic Chem.	3
Or		Econ. 203 Prin. of Economics	3
Engl. 231 or 232 Survey of Engl. Lit.	3	Govt. 206 Amer. National Govt.	3
Ento. 201 <sup>1</sup> Gen. Entomology	3	M.S. or A.S.	1
M.S. or A.S.	1	Elective	2
Phys. 213 Phys. for Agr. Students	3	P.E. 202	R
Elective	2		—
P.E. 201	R		18
	—		
	18		

### JUNIOR YEAR

Ag.Ec. 314 Mktg. Agri. Products	3	B.A. 430 Cost Acct. Survey	3
B.A. 409 Surv. of Accounting Prin.	3	D.S. 307 Judg. Dairy Products	1
D.S. 301 Market Milk	4	D.S. 311 Tech. Control of Dairy Prod.	4
D.S. 320 Bact. of Dairy Products	4	D.S. 316 Butter & Cheese Mfg.	4
Elective	4	Spch. 403 Public Speaking	3
	—	Elective	3
	18		—
			18

### SENIOR YEAR

B.N. 401 Human Nutrition	3	B.A. 422 Personnel Prob. of Ind.	3
B.A. 211 Business Law	3	D.S. 407 Ice Cream Mfg.	3
D.S. 410 Dairy Plant Mgmt.	2	D.S. 415 Cond. & Powd. Milk	3
Engl. 301 Writ. for Prof. Men	3	D.S. 481 Seminar	1
Or		Hist. 326 Hist. of Texas	3
Jour. 415 Agri. Journalism	3	Elective	5
Hist. 325 Trends in Amer. Hist.	3		—
Elective	4		18
	—		
	18		

- NOTES: 1. Students who expect to major in dairy manufacturing may substitute Math. 103 or 110 for P.S. 201 or Ento. 201.
2. Electives shall be selected and substitutions made with the advice of the Head of the Department.
3. Not more than 6 elective credit hours of advanced courses in dairy science will be permitted toward requirements for graduation.

## Dairy Production Option

This major is designed for students interested in careers as dairy farm operators or managers; as dairy herd owners and breeders of dairy cattle; as teachers and research workers in dairy nutrition, breeding, or management; as extension dairy specialists and organization leaders and as workers in allied fields.

## FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Agro. 105 Fund. of Crop Prod.	3	An.Sc. 107 Gen. Animal Science	3
Biol. 107 Vertebrate Zoology	3	Biol. 101 Gen. Bot. of Seed Plants	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	M.S. or A.S.	1
M.S. or A.S.	1	P.S. 201 <sup>1</sup> Poultry Production	3
P.E. 101	R	Elective	1
	—	P.E. 102	R
	17		—
			18

## SOPHOMORE YEAR

Chem. 231 Elem. Organic Chemistry	3	Ag.En. 201 Farm Power & Mach.	3
D.S. 202 Dairying	3	Biol. 206 Intr. Microbiology	3
Econ. 203 Prin. of Economics	3	Chem. 223 Elem. Quant. Analysis	3
Ento. 201 Gen. Entomology	3	Engl. 210 Intr. to Logical Disc.	3
M.S. or A.S.	1	Or	
Phys. 213 Physics for Agr. Students	3	Engl. 231 or 232 Survey of Engl. Lit.	3
Elective	2	Govt. 206 American National Govt.	3
P.E. 201	R	M.S. or A.S.	1
	—	Elective	2
	18	P.E. 202	R
			—
			18

## JUNIOR YEAR

D.S. 301 Market Milk	4	Agro 301 Soil Science	4
D.S. 303 Dairy Cattle Judg.	1	Agro. 308 Forage Crops	3
D.S. 320 Bact. of Dairy Products	4	An.Sc. 303 Animal Nutrition	3
Gen. 301 Genetics	4	An.Sc. 306 Animal Breeding	3
V.P.P. 323 Physiol. of Farm Animals	3	Spch. 403 Public Speaking	3
Elective	2	Elective	2
	—		—
	18		18

## SENIOR YEAR

Ag.Ec. 314 Mktg. Agri. Products	3	D.S. 324 Comm. Dairy Products	3
Ag.En. 335 Water Contr. & Utiliz.	3	D.S. 418 Feed. & Mgmt. of Dairy Cattle	4
D.S. 417 Hist. & Dev. of Dairy Cattle	3	D.S. 481 Seminar	1
Engl. 301 Writing for Prof. Men		Hist. 326 Hist. of Texas	3
Or		Elective	7
Jour. 415 Agri. Journalism	3		—
Hist. 325 Trends in Amer. Hist.	3		18
Elective	3		
	—		
	18		

- NOTES: 1. Students who expect to major in dairy production may substitute Math. 103 or 110 for P.S. 201.
2. Electives shall be selected and substitutions made with the advice of the Head of the Department.
3. At least 16 but not more than 24 credit hours of advanced courses in the student's major department shall be permitted towards requirements for graduation.

Curriculum in  
ENTOMOLOGY

The program in entomology is intended to prepare students for careers in either research, extension, teaching, business, or industry. The curriculum includes basic studies in insect taxonomy, morphology, physiology, toxicology, and economic entomology. It also includes fundamental subject matter in the various fields of agriculture as well as in the biological sciences.



## FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Agro. 105 Fund. of Crop Prod.	3	An.Sc. 107 Gen. Animal Science	3
Biol. 107 Vertebrate Zoology	3	Biol. 101 Gen. Bot. of Seed Plants	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	M.S. or A.S.	1
M.S. or A.S.	1	P.S. 201 Poultry Production	3
P.E. 101	R	Elective	1
	17	P.E. 102	R
			18

## SOPHOMORE YEAR

Chem. 231 Elem. Organic Chem.	3	Ag.En. 201 Farm Power & Mach.	3
D.S. 202 Dairying	3	Biol. 206 Intr. Microbiology	3
Econ. 203 Prin. of Economics	3	Chem. 223 Elem. Quant. Analysis	3
Ento. 201 Gen. Entomology	3	Engl. 203 Intr. to Lit.	3
M.S. or A.S.	1	Or	
Phys. 213 Phys. for Agr. Students	3	Engl. 210 Intr. to Logical Disc.	3
P.E. 201	R	Hort. 201 Gen. Horticulture	3
	16	M.S. or A.S.	1
		Elective	3
		P.E. 202	R
			19

## JUNIOR YEAR

Agro. 301 Soil Science	4	Ento. 302 System. Entomology	3
Ento. 301 System. Entomology	3	Ento. 306 Insect Physiology	3
Ento. 305 Insect Morphology	3	Gen. 301 Genetics	4
Govt. 206 Amer. National Govt.	3	Hort. 319 Orchard Mgmt.	3
Elective	5	Elective	5
	18		18

## SENIOR YEAR

Ento. 401 Prin. of Insect Control	3	Engl. 301 Writing for Prof. Men	3
Ento. 423 Comp. Anat. of Arthropods	3	Ento. 402 Gen. Econ. Entomology	3
Hist. 325 Trends in Amer. Hist.	3	Ento. 424 Insect Ecology	3
P.P.P. 301 Plant Pathology	3	Hist. 326 Hist. of Texas	3
Spch. 403 Public Speaking	3	Soc. 407 Human Rel. in Agr.	3
Elective	4	Elective	3
	19		18

NOTES: 1. Electives shall be selected and substitutions made with the advice of the Head of the Department.

2. At least 16 but not more than 24 credit hours of advanced courses in the student's major department shall be permitted toward requirements for graduation.

Curriculum in  
FOOD TECHNOLOGY

The curriculum in food technology is designed to train students in the technical and scientific problems of food processing and manufacturing. This course of study includes a number of elective hours, enabling the student to take major work in production, processing, inspection, and grading of dairy products, fruit and vegetable products, and miscellaneous foods and beverages. Students majoring in this curriculum are under the supervision of a committee on food technology, appointed from the agricultural teaching staff by the Dean of Agriculture.

## FRESHMAN YEAR

Biol. 101 Gen. Bot. of Seed Plants	3	Biol. 107 Vertebrate Zoology	3
Chem. 101 Gen. Chem.	4	Chem. 102 Gen. Chemistry	4
E.G. 105 Engr. Graphics	2	Engl. 104 Composition & Rhetoric	3
Engl. 103 Composition & Rhetoric	3	Math. 116 Plane Trig. & Anal. Geom.	4
Math. 102 Algebra	3	M.E. 101 Engineering Prob.	1
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	Elective	1
	16	P.E. 102	R
			17

## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Ag.Ec. 314 Mktg. Agr. Products	3	Chem. 317 Quantitative Analysis	2
Chem. 316 Quantitative Analysis	2	Chem. 320 Instrum. Anal. Lab.	2
Chem. 319 Quant. Anal. Lab.	2	Econ. 203 Prin. of Economics	3
Govt. 206 Amer. National Govt.	3	Engl. 210 Intr. to Logical Disc.	3
M.S. or A.S.	1	Or	
Phys. 201 College Physics	4	Engl. 231 or 232 Surv. of Engl. Lit.	3
Elective	3	M.S. or A.S.	1
P.E. 201	R	Phys. 202 College Physics	4
	18	Elective	3
		P.E. 202	R
			18

## JUNIOR YEAR

Biol. 206 Intr. Microbiology	3	Ag.En. 213 Food Plant Engr.	3
B.A. 409 Surv. of Accounting Prin.	3	Chem. 228 Organic Chemistry	4
Chem. 227 Organic Chemistry	4	D.S. 326 Food Bacteriology	4
Elective	8	Elective	7
	18		18

## SENIOR YEAR

B.A. 303 Statistical Method	4	B.N. 401 Human Nutrition	3
Hist. 325 Trends in Amer. Hist.	3	B.A. 211 Business Law	3
Psy. 207 Gen. Psychology	3	Chem. 342 Physical Chemistry	4
Spch. 403 Public Speaking	3	Engl. 301 Writing for Prof. Men	3
Elective	6	Hist. 326 Hist. of Texas	3
	19	Elective	3
			19

NOTE: Students enrolled in food technology will select an option in meat, dairy, horticulture, or poultry products and, with the counsel of a member of the Food Technology Committee, will prepare a plan of study for his approval.

Two-Year Curriculum in  
FORESTRY

The two-year curriculum in forestry provides the student with fundamental courses necessary for him to enter a Southern accredited school of forestry with junior standing. In addition to the arts and sciences, the curriculum includes the basic courses of plane surveying, agronomy, ecology, and forestry. The curriculum provides the fundamentals for study in the propagation, protection, and management of commercial timbers, the processing and manufacture of wood products, and the conservation of all products derived from forests. All accredited Southern forestry schools have approved the curriculum as adequate to permit the student to obtain his Bachelor of Science degree in Forestry upon the completion of two additional years of study. The Texas Legislature has provided funds which are available to defray certain out-of-state expenses for Texas students who attend accredited Southern forestry schools for the junior and senior years.

During the junior and senior years, the forestry student has the opportunity to specialize in forest production, forest utilization, wood technology, pulp and paper technology, wood products merchandising, or extension and public relations forestry.

A degree from an accredited school of forestry prepares the graduate for work in the fields of forest administration, management, research, and education.

## FRESHMAN YEAR

Biol. 101 Gen. Bot. of Seed Plants	3	Biol. 102 Taxon. of Flower Plants	3
Chem. 101 Gen. Chem.	4	Biol. 108 Invertebrate Zoology	3
E.G. 105 Engr. Graphics	2	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	R.S. 102 Intr. to Range & Forestry	1
	16	P.E. 102	R
			18

## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
C.E. 201 Plane Surveying	4	Agro. 301 Soil Science	4
Econ. 203 Prin. of Economics	3	For. 204 Dendrology	3
Engl. 210 Intr. to Logical Disc.	3	Geog. 203 Physical Geography	4
For. 203 Dendrology	2	Govt. 206 Amer. National Govt.	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 213 Phys. for Agr. Students	3	R.S. 205 Plant Ecology	3
Elective	3	P.E. 202	R
P.E. 201	R		18
	19		

NOTE: Students who complete this two-year curriculum may continue their work for a degree in forestry in any accredited Southern forestry school. Funds have been appropriated by the Texas Legislature to help defray certain out-of-state expenses for Texas students attending such schools for their junior and senior years.

Curriculum in  
POULTRY SCIENCE

The growth of the poultry industry and the need for a rapid expansion of scientific and technical knowledge in the various fields of science basic to successful poultry production have supplied the motivation for the development of courses in this phase of agriculture. In no field of agriculture is an understanding of the science and practice of feeding, breeding, physiology, pathology, heating, ventilation, processing, and marketing more necessary or more rewarded than in the modern intensive methods of producing poultry meat and eggs. Undergraduate students are trained to operate commercial poultry farms, hatcheries, feed mills, and poultry processing plants. They also find employment with such allied industries as feed manufacturers, equipment distributors, and manufacturers of vaccines and biologics, with poultry publications, and with the Extension Service. Many graduates in poultry science choose to take graduate work in this and allied fields.

## FRESHMAN YEAR

Agro. 105 Fund. of Crop Prod.	3	An.Sc. 107 Gen. Animal Science	3
Biol. 107 Vertebrate Zoology	3	Biol. 101 General Bot. of Seed Plants	3
Chem. 101 General Chemistry	4	Chem. 102 General Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	M.S. or A.S.	1
M.S. or A.S.	1	P.S. 201 Poultry Production	3
P.E. 101	R	Elective	1
	17	P.E. 102	R
			18

## SOPHOMORE YEAR

Chem. 231 Elem. Organic Chemistry	3	Ag.En. 201 Farm Power & Mach.	3
D.S. 202 Dairying	3	Biol. 206 Intr. Microbiology	3
Econ. 203 Prin. of Economics	3	Chem. 223 Elem. Quant. Anal.	3
Engl. 203 Intr. to Literature	3	Engl. 210 Intr. to Logical Discourse	3
Ento. 201 Gen. Entomology	3	Hort. 201 Gen. Horticulture	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 213 Physics for Agr. Students	3	Elective	1
P.E. 201	R	P.E. 202	R
	19		17

## JUNIOR YEAR

Ag.Ec. 314 Mktg. Agr. Products	3	Agro. 301 Soil Science	4
Gen. 301 Genetics	4	Govt. 206 Amer. National Govt.	3
P.S. 411 Poultry Feeding	4	P.S. 303 Turkey Production	2
V.P.P. 323 Phys. of Farm Animals	3	P.S. 308 Hatchery Management	3
Elective	4	V.Mi. 334 Poultry Diseases	3
	18	Elective	3
			18



## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Engl. 301 Writ. for Prof. Men		Hist. 326 Hist. of Texas	3
Or		P.S. 481 Poultry Seminar	1
Jour. 415 Agr. Journalism	3	Soc. 407 Hum. Rel. in Agr.	3
Hist. 325 Trends in Amer. Hist.	3	Spch. 403 Public Speaking	3
P.S. 309 Broiler Production	3	Elective	8
P.S. 407 Tech. & Mktg. of Poultry	3		18
P.S. 414 Poultry Breeding	3		
Elective	3		
	18		

NOTES: 1. Electives shall be selected and substitutions made with the advice of the Head of the Department.

2. At least 16 but not more than 24 credit hours of advanced courses in the student's major department shall be permitted toward requirements for graduation.

Curriculum in  
RANGE SCIENCE

This curriculum is designed to give students a thorough understanding of the great variety of problems met in the multiple use and conservation of noncultivated grazing lands. The first phase of training includes work in the physical, biological, and social sciences. Specialized courses in range science, range ecology, agrostology, forestry and conservation of natural resources are included in the last two years.

Graduates are prepared to enter the ranch business as owners or managers, for work as county agricultural agents, for work with Experiment Stations, and as college teachers in this field. A Bachelor's degree in range science gives the student the background for study toward advanced degrees. Men meeting Civil Service requirements are eligible for appointment with several United States Government agencies.

## FRESHMAN YEAR

Biol. 101 Gen. Bot. of Seed Plants	3	Biol. 107 Vertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
R.S. 102 Intr. to Range & For.	1	Elective*	3
P.E. 101	R	P.E. 102	R
	15		17

## SOPHOMORE YEAR

Biol. 102 Taxon. of Flowering Plants	3	Chem. 228 Organic Chemistry	4
Chem. 227 Organic Chemistry	4	Govt. 206 Amer. National Govt.	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	M.S. or A.S.	1
W.S. 201 Conserv. & Mgmt.	3	R.S. 205 Plant Ecology	3
Elective*	3	Elective*	3
P.E. 201	R	P.E. 202	R
	17		17

## JUNIOR YEAR

Agro. 301 Soil Science	4	Agro. 310 Soil Morphology	2
An.Sc. 303 Animal Nutrition	3	Econ. 203 Prin. of Economics	3
P.P.P. 313 Intr. to Plant Phys.	3	Gen. 301 Genetics	4
R.S. 303 Agrostology	3	R.S. 315 Veg. Eval. Meth.	3
R.S. 314 Prin. of Range Mgmt.	3	R.S. 316 Grassland Ecology	3
	16	Elective*	3
			18

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Ag.En. 335 Water Contr. & Utiliz.	3	Ag.Ec. 422 Land Economics	3
R.S. 417 Synecology	3	An.Sc. 406 Beef Cattle Prod.	3
R.S. 481 Seminar	1	R.S. 415 Adv. Range Mgmt.	4
Elective*	11	R.S. 481 Seminar	1
	—	Elective*	7
	18		18

\*Elective hours will be chosen by the student in consultation with his faculty advisor in the following manner: Nine hours of course work are to be chosen from the area of writing and speaking skills, humanities, and social sciences. Twenty-one hours of course work must be elected in conference with the student's advisor.

Curricula in  
SOCIOLOGY

Trained personnel are needed in sociology in the fields of population analysis, anthropology, social psychology, community development and social work.

## Human Relations Option

The program affords professional training in human relations with special emphasis on social problems, community development, social anthropology, social work, criminology and juvenile delinquency, population, institutions, and group organization. Graduates are qualified for employment as case workers, Chamber of Commerce directors, probation or parole officers, and Boy Scout executives.

## FRESHMAN YEAR

Biol. 107 Vertebrate Zoology	3	Biol. 101 Gen. Bot. of Seed Plants	3
Engl. 103 Composition & Rhetoric	3	Chem. 106 Gen. Chemistry	4
Geol. 205 Elem. Geology	4	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Geog. 201 World Regional Geog.	3
Math. 102 Algebra	3	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	Elective	1
	17	P.E. 102	R
			18

## SOPHOMORE YEAR

Engl. 203 Intr. to Literature	3	Econ. 203 Prin. of Economics	3
Govt. 206 Amer. National Govt.	3	Engl. 210 Intr. to Logical Discourse	3
M.S. or A.S.	1	M.S. or A.S.	1
Psy. 207 General Psychology		Phys. 211 Brief Survey of Phys.	4
Or		Soc. 206 Soc. Inst. & Processes	3
Psy. 301 Educational Psy.	3	Elective	4
Soc. 205 Prin. of Sociology	3	P.E. 202	R
Elective	5		—
P.E. 201	R		18
	18		

## JUNIOR YEAR

Educ. 423 Prin. & Pract. of Tchg.		B.A. 303 Statistical Method	4
Or		Jour. 406 Publicity & Pub. Rel.	3
Psy. 323 Psy. of Adolescence	3	Soc. 320 Social Anthropology	3
Phil. 301 Intr. to Philosophy	3	Soc. 412 Population Analysis	3
Soc. 306 Prin. of Social Work		Elective	5
Or			—
Soc. 314 Social Problems	3		18
Elective	9		
	18		

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Biol. 325 Phys. Anthropology	3	Ag.Ec. 429 Agricultural Policy	3
C.E. 408 Municipal Admin.	3	B.A. 422 Personnel Prob. of Ind.	3
Soc. 404 Community Devel.	3	Soc. 430 Sociological Theory	3
Soc. 411 Social Psychology	3	Elective	9
Soc. 481 Seminar	1		—
Spch. 403 Public Speaking	3		18
Elective	2		
	18		

## Rural Leadership Option

This program affords professional training in rural sociology. Training is given in both the human side and the technical side of agriculture for students preparing to become county agricultural agents, participants in foreign agricultural programs, rural ministers, agricultural missionaries, and leaders in rural development programs.

## FRESHMAN YEAR

Ag.Ec. 105 Intr. to Ag. Economics	3	Agro. 105 Fund. of Crop Prod.	3
Biol. 107 Vertebrate Zoology	3	An.Sc. 107 Gen. Animal Science	3
Chem. 101 General Chemistry	4	Biol. 101 Gen. Bot. of Seed Plants	3
Engl. 103 Composition & Rhetoric	3	Chem. 102 Gen. Chemistry	4
Math. 102 Algebra	3	Engl. 104 Composition & Rhetoric	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	Elective	1
	17	P.E. 102	R
			18

## SOPHOMORE YEAR

D.S. 202 Dairying		Ag.En. 201 Farm Power & Mach.	3
Or		Biol. 206 Intr. Microbiology	3
P.S. 201 Poultry Production	3	Chem. 231 Elem. Organic Chem.	3
Engl. 203 Intr. to Literature	3	Engl. 210 Intr. to Logical Discourse	2
Ento. 201 Gen. Entomology	3	M.S. or A.S.	1
Hort. 201 Gen. Horticulture	3	Psy. 207 Gen. Psychology	3
M.S. or A.S.	1	Elective	2
Phys. 213 Phys. for Agr. Students	3	P.E. 202	R
Soc. 205 Prin. of Sociology	3		—
P.E. 201	R		17
	19		

## JUNIOR YEAR

Agro. 301 Soil Science	4	Ag.Ec. 314 Mktg. Agri. Products	3
Econ. 203 Prin. of Economics	3	Gen. 301 Genetics	4
Govt. 206 Amer. National Govt.	3	Soc. 320 Social Anthropol.	3
Jour. 415 Agricultural Jour.	3	Elective	8
Soc. 306 Prin. of Social Work	3		—
Elective	2		18
	18		

## SENIOR YEAR

Ag.Ec. 413 Agri. Cooperatives		Ag.Ec. 429 Agricultural Policy	3
Or		Hist. 326 Hist. of Texas	3
Ag.Ec. 422 Land Economics	3	Soc. 315 The Family	3
An.Sc. 303 Animal Nutrition	3	Soc. 407 Human Rel. in Agri.	3
Hist. 325 Trends in Amer. Hist.	3	Spch. 403 Public Speaking	3
Soc. 404 Community Develop.	3	Elective	3
Soc. 411 Social Psychology	3		—
Soc. 481 Seminar	1		18
Elective	2		
	18		



### Curricula in SOIL AND CROP SCIENCES

Training in the Department of Soil and Crop Sciences is broad and basic enough in scope to include all the aspects of agricultural crop production, processing, distribution and marketing, as well as the study of soil and its relationship to plant growth.

The student has the opportunity to select the area in which he has greatest interest by choosing one of the several curricula available in the department.

The general curriculum followed in the first two years is designed to give the student the necessary foundation in the basic sciences of botany, chemistry, entomology, genetics, and mathematics upon which to build his selected specialized courses in the last two years.

There are four curricula available that allow the student a wide choice in specialized training. Three of the curricula are designed to give broad and basic training and include work in agronomic crops, floricultural crops, fruit and vegetable crops, and in the study of soils and plant-soil-water-nutrition relationships.

The fourth curriculum is a four year plant and soil science curriculum designed to prepare students for the more intensified scientific opportunities that exist in this field, including basic preparation for graduate work. An interdepartmental curriculum in food technology also can be pursued in this department with emphasis on fruit and vegetable crops.

### Curricula in AGRONOMY, FLORICULTURE, AND HORTICULTURE

#### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 Gen. Bot. of Seed Plants	3	Agro. 105 Fund. of Crop Prod.	3
Chem. 101 Gen. Chemistry	4	Biol. 102 Taxon. of Flowering Plants	
Engl. 103 Composition & Rhetoric	3	Or	
Math. 102 Algebra	3	Biol. 107 Vertebrate Zoology	3
M.S. or A.S.	1	Chem. 102 Gen. Chemistry	4
S.C.S. 101 Intr. to Soil & Crop Sci.	1	Engl. 104 Composition & Rhetoric	3
P.E. 101	R	Math. 103 Plane Trigonometry	3
	15	M.S. or A.S.	1
		P.E. 102	R
			17

#### SOPHOMORE YEAR

Ag.En. 325 Farm Electricity		Biol. 206 Intr. Microbiology	3
Or		Engl. 203 Intr. to Literature	
Phys. 213 Phys. for Students of Agr.	3	Or	
Chem. 232 Elem. Organic Chem.	5	Engl. 210 Intr. to Logical Discourse	3
Ento. 201 Gen. Entomology	3	Hist. 106 Hist. of United States	3
Flor. 201 Prin. of Floriculture	3	Hort. 201 Gen. Horticulture	3
Hist. 105 Hist. of United States	3	L.A. 311 Use of Lib. Resources	1
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 201	R	Elective	2
	18	P.E. 202	R
			16

### Curriculum in AGRONOMY

The program in agronomy prepares students for work in the broad field of soil management and crop production. Agronomy training gives the student a thorough understanding of the basic sciences and, in addition, teaches him how to apply this knowledge in the improvement of crops and soils. The first phase of training includes such subjects as mathematics, chemistry, botany, entomology, bacteriology, genetics, and plant physiology. Specialized courses in plant and soil science, which emphasize efficient crop production practices and the conservation and improvement of soils, are provided in the last two years of the curriculum.

The agronomy graduate is well trained in those subjects dealing with crops and soils and is qualified for the numerous activities related to this field of training. Professional opportunities include those in farming, farm management, and land appraisal; in fertilizer manufacture and sales, seed companies, grain marketing and milling, and agricultural equipment and supply businesses; in extension and education as county agents, extension specialists, college instructors, agricultural public relation specialists, and agricultural editors and directors; and in technical fields with the Agricultural Experiment Stations, United States Department of Agriculture, and Soil Conservation Service.

## FRESHMAN AND SOPHOMORE YEARS

(See Page 88)

## JUNIOR YEAR

First Semester		Credit	Second Semester		Credit
Agro. 301	Soil Science	4	Ag.Ec. 314	Mktg. Agr. Products	
Econ. 203	Prin. of Economics	3	Or		
Govt. 206	Amer. National Govt.	3	Ag.Ec. 325	Prin. of Farm & Ranch Mgmt.	3
P.P.P. 301	Plant Pathology	3	Ag.En. 335	Water Control & Util.	3
P.P.P. 313	Intr. to Plant Phys.	3	An.Sc. 303	Animal Nutrition	3
Elective		2	Gen. 301	Genetics	4
		18	Elective		5
					18

## SENIOR YEAR

Agro. 306	Grain & Fiber Crops	4	Spch. 403	Public Speaking	3
Engl. 301	Writ. for Prof. Men		Elective (Social Science)		3
Or			Elective		11
Jour. 415	Agr. Journalism	3			
Elective		10			17
		17			

- NOTES: 1. Electives shall be selected with the advice of the student's faculty advisor, from whom a list of suggested electives may be obtained.
2. At least 16 but not more than 24 credit hours of advanced courses in Agronomy shall be permitted toward requirements for graduation.

Curriculum in  
FLORICULTURE

Floriculture and landscape horticulture are branches of agriculture concerned with the scientific production, distribution, marketing, and landscape use of ornamental plants and plant products.

The program in floricultural science is designed to prepare students for careers in the highly specialized and scientific operations involved in the production and marketing of nursery and greenhouse crops; the varied horticultural activities required in the development and maintenance of parks, recreation, and other landscaped areas both public and private; for positions in associated industries requiring executives, managers, and experts in the growing, packing, shipping, and storage operations associated with greenhouse and nursery crops; as well as floral designers and technically trained salespeople. Many opportunities for employment also exist in teaching, research, and extension.

## FRESHMAN AND SOPHOMORE YEARS

(See Page 88)

## JUNIOR YEAR

Agro. 301	Soil Science	4	Ag.En. 335	Water Control & Util.	3
Econ. 203	Prin. of Economics	3	Flor. 307	Land. Plant Materials	3
Flor. 206	Woody Ornam. Plants	3	Gen. 301	Genetics	4
P.P.P. 301	Plant Pathology	3	Govt. 206	Amer. National Govt.	3
P.P.P. 313	Intr. to Plant Physiol.	3	Elective		5
Elective		2			
		18			18

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Engl. 301 Writ. for Prof. Men		Flor. 424 Sci. Plant Propagation	3
Or		Flor. 425 Land. Maint. & Constr.	4
Jour. 415 Agr. Journalism	3	Spch. 403 Public Speaking	3
Flor. 319 Exotic Plants	3	Elective (Social Science)	3
Flor. 429 Nurs. & Greenh. Crops	4	Elective	4
Elective	7		
	17		17

NOTE: Electives shall be selected with the advice of the student's faculty advisor.

Curriculum in  
HORTICULTURE

Horticulture is a science and an important component of the agricultural industry. It includes pomology (tree fruits, small fruits, and nuts), olericulture (vegetables grown in fields, greenhouses, and forcing structures), and processing (freezing, canning, and dehydration of horticultural crops).

Those planning careers in horticultural crops production, processing, packaging, industries, businesses, and state or federal agencies will wish to select this curriculum. Horticulturists often serve as field representatives and management personnel for canning and freezing companies, seed firms, and for manufacturers of fertilizers, spray materials, and farm equipment. Many are employed as inspectors of fresh and processed horticultural crops. Others are writers for farm and garden publications, television, and radio. The need for horticulturists in Agricultural Extension work is becoming more acute each year.

## FRESHMAN AND SOPHOMORE YEARS

(See Page 88)

## JUNIOR YEAR

Econ. 203 Prin. of Economics	3	Ag.Ec. 314 Mktg. Agr. Products	
Hort. 311 Processing Hort. Crops	3	Or	
Hort. 322 Veget. Crops Mgmt.	3	Ag.Ec. 325 Prin. of Farm & Ranch Mgmt.	3
P.P.P. 301 Plant Pathology	3	Agro. 301 Soil Science	4
P.P.P. 313 Intr. to Plant Physiol.	3	Gen. 301 Genetics	4
Elective	3	Govt. 206 Amer. National Govt.	3
	18	Hort. 319 Orchard Mgmt.	3
			17

## SENIOR YEAR

Ag.En. 335 Water Control & Util.	3	Ento. 405 Horticultural Pests	3
Engl. 301 Writ. for Prof. Men		Spch. 403 Public Speaking	3
Or		Elective (Social Sciences)	3
Jour. 415 Agr. Journalism	3	Elective	8
Hort. 481 Seminar	1		
Elective	11		17
	18		

NOTE: Electives shall be selected with the advice of the student's faculty advisor.

Curriculum in  
PLANT AND SOIL SCIENCE

The science curriculum is designed for the outstanding student who is interested in preparing himself for the scientific agricultural industries of the future. This curriculum requires intensive training in biology, chemistry, mathematics, and physics. While emphasis is on basic sciences, a foundation in social sciences and humanities and agricultural sciences is also included.

The curriculum is designed to prepare the student for graduate study, research, teaching, commercial agriculture, and provide him with better scientific qualifications for other positions available to graduates with a major in one of the other plant or soils curricula in the College of Agriculture.



## FRESHMAN YEAR

(Same as for Soil and Crops Sciences, page 88, except that plants majors may substitute Flor. 201 or Hort. 201 for Agro. 105.)

## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Biol. 206 Intr. Microbiology	3	Engl. 203 Intr. to Literature	
Chem. 227 Organic Chemistry	4	Or	
L.A. 311 Use of Library Res.	1	Engl. 210 Intr. to Logical Discourse	3
Math. 121 Anal. Geom. & Calculus	4	Ento. 201 Gen. Entomology	3
M.S. or A.S.	1	Math. 210 Calculus	3
Phys. 201 College Physics		M.S. or A.S.	1
Or		Phys. 202 College Physics	
Phys. 218* Mechanics & Heat	4	Or	
P.E. 201	R	Phys. 219* Sound, Light, Electr.	4
	17	Approved Elective	3
		P.E. 202	R
			17

\*All soils majors will elect Physics 218 and 219.

## JUNIOR YEAR

Chem. 316 Quantitative Analysis	2	Agro. 301 Soil Science	4
Chem. 319 Quant. Analysis Lab.	2	Govt. 206 Amer. National Govt.	3
Econ. 203 Prin. of Economics	3	Hist. 106 Hist. of United States	3
Gen. 301 Genetics	4	P.P.P. 314 Prin. of Plant Phys.	4
Hist. 105 Hist. of United States	3	Approved Elective	3
P.P.P. 313 Intr. to Plant Phys.	3		—
	17		17

## SENIOR YEAR

Engl. 301 Writ. for Prof. Men	3	Spch. 403 Public Speaking	3
P.P.P. 301 Plant Pathology	3	Stat. 406 Statistical Methods	3
Approved Elective	12	Approved Elective	11
	18		17

NOTE: Students must select all electives with the advice of the faculty advisor of the subject matter curriculum in which they are primarily interested. A list of suggested electives may be obtained from the faculty advisor.

Curriculum in  
WILDLIFE SCIENCE

This curriculum includes work in all phases of fisheries and wildlife. At the beginning of the sophomore year, the student should elect one of the two options, fisheries or wildlife, because of difference in the basic sciences required. The junior and senior years are largely years of specialization.

This curriculum is designed (1) to train individuals in the art of managing wildlife and fisheries, and of maintaining populations at levels consistent with good land-use practices and the desirability of the species involved; (2) to train for research in taxonomy, distribution, and ecology of fishes, reptiles, amphibians, birds, and mammals; and (3) to train for teaching at the high school and university levels. Opportunities are provided also, in cooperation with the Departments of Journalism and of Education, for training in the field of wildlife journalism and conservation education. For students planning careers in research and/or teaching at the college level, an advanced degree will be required.

Upon completion of the wildlife science curriculum, graduates are prepared to enter occupations in the fisheries and/or wildlife fields, including management, research, teaching, and public relations. Those meeting Civil Service requirements are eligible for appointments with the United States Fish and Wildlife Service and other federal agencies. Also, graduates are eligible for employment by the various state game and fish commissions. A few positions are open from time to time as wildlife managers on private ranches and as writers of articles on outdoor life.

## FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 Gen. Bot. of Seed Plants	3	Biol. 102 Taxon. of Flower. Plants	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	Elective	1
	—	P.E. 102	R
	17		—
			18

## SOPHOMORE YEAR

Biol. 107 Vertebrate Zoology	3	Biol. 108 Invertebrate Zoology	3
Engl. 203 Intr. to Literature	3	Chem. 231 Elem. Organic Chem.	3
For. 203 Dendrology	2	Engl. 210 Intr. to Logical Discourse	3
Govt. 206 Amer. National Govt.	3	For. 204 Dendrology	3
M.S. or A.S.	1	Geol. 205 Elem. Geology	4
Phys. 213 Phys. for Agr. Students	3	M.S. or A.S.	1
W.S. 201 Conserv. & Mgmt.	3	P.E. 202	R
P.E. 201	R		—
	—		17
	18		

## JUNIOR YEAR

Econ. 203 Prin. of Economics	3	Agro. 301 Soil Science	4
Ento. 313 Biology of Insects	3	R.S. 316 Grassland Ecology	3
Gen. 301 Genetics	3	Soc. 407 Human Rel. in Agr.	3
W.S. 311 Ichthyology	3	W.S. 315 Herpetology	3
Elective	6	Elective	6
	—		—
	19		19

## SENIOR YEAR

Spch. 403 Public Speaking	3	Ag.Ec. 422 Land Economics	3
Stat. 406 Statistical Methods	3	Engl. 301 Writ. for Prof. Men	3
W.S. 401 General Mammalogy	3	Jour. 415 Agr. Journalism	3
W.S. 403 Animal Ecology	3	W.S. 402 General Ornithology	3
Elective	6	W.S. 408 Wildlife Management Tech.	3
	—	Elective	3
	18		—
			18

## Fisheries Option

## FRESHMAN YEAR

(Same as for Wildlife Science, see above)

## SOPHOMORE YEAR

Biol. 107 Vertebrate Zoology	3	Biol. 108 Invertebrate Zoology	3
Chem. 223 Elem. Quant. Anal.	3	Chem. 231 Elem. Organic Chem.	3
Engl. 203 Intr. to Literature	3	Econ. 203 Prin. of Economics	3
M.S. or A.S.	1	Engl. 210 Intr. to Logical Discourse	3
Soc. 205 Prin. of Sociology	3	Geol. 205 Elem. Geology	4
W.S. 201 Conservation & Mgmt.	3	M.S. or A.S.	1
Elective	3	P.E. 202	R
P.E. 201	R		—
	—		17
	19		

## JUNIOR YEAR

Biol. 217 Comp. Anat. of Vert.	3	Agro. 301 Soil Science	4
Ento. 313 Biology of Insects	3	Biol. 344 Embryology	3
Gen. 301 Genetics	4	Govt. 206 Amer. National Govt.	3
Phys. 213 Phys. for Agr. Students	3	Spch. 403 Public Speaking	3
W.S. 311 Ichthyology	3	W.S. 312 Ichthyology	3
Elective	3	Elective	3
	—		—
	19		19

## SENIOR YEAR

First Semester		Credit	Second Semester		Credit
Biol. 435	Adv. Invert. Zoology	4	Jour. 415	Agr. Journalism	3
Engl. 301	Writ. for Prof. Men	3	Stat. 406	Statistical Methods	3
W.S. 417	Biology of Fishes	3	W.S. 410	Conserv. & Mgmt. of Fishes	3
Elective		7	Elective		9
		<hr/> 17			<hr/> 18

- NOTES: 1. Electives shall be selected and substitutions made with the advice of the Head of the Department.
2. At least 16 but not more than 24 credit hours of advanced courses in the student's major department shall be permitted toward requirements for graduation.
3. Majors in the wildlife science option must participate in the summer field course, W.S. 300, or submit evidence of satisfactory summer employment as biologists' aid with a state game and fish commission, the U. S. Fish and Wildlife Service, or other agency.
4. Majors in the fisheries option must participate in the summer field course, W.S. 400, or submit evidence of satisfactory summer employment as biologists' aid with a state game and fish commission, the U. S. Fish and Wildlife Service, or other agency.



# *The College of Arts and Sciences*

The purpose of the College of Arts and Sciences is to assist the University in the development of the educated man—an individual who is aware of his responsibilities as a citizen in society, who is capable of understanding himself and the world about him, and who is qualified in arriving at realistic and workable solutions to new problems. The arts and sciences represent a continuing quest by man to know and understand the nature and the meaning of the universe, to pursue his life's course with personal dignity and civic effectiveness, and to achieve the highest ideals and values of his cultural heritage and his destiny.

In an institution of university scope, the College of Arts and Sciences has a two-fold mission. Like the other major divisions of the institution, it directs the education of those students who major in its own academic programs. But it also serves as a partner of the other degree-granting colleges by contributing to the liberal and scientific education of students who major in other fields.

## **CURRICULA**

### **Business Administration**

Accounting

Finance

Management

Marketing

### **Liberal Arts**

Economics

English (Language and Literature)

History

Government

Journalism

Mathematics

Modern Languages

Pre-Law

### **Psychology and Preparation for Teaching**

Psychology

Education

Physical Education

### **Science**

Botany

Chemistry

Entomology

Meteorology

Microbiology

Physics

Premedical and

Pre dental Program

Zoology

## **COMBINED DEGREE PLAN**

Students may also pursue a five-year program combining full professional training with a broad general education to qualify for two degrees. The student contemplating such a program should have a two-year grade point ratio above the normal minimum requirements and should consult with the heads of both departments and the deans concerned prior to formulating a combined degree plan.

## **REQUIREMENT OF PROFICIENCY IN WRITTEN ENGLISH**

In order to qualify for candidacy for a degree in the College of Arts and Sciences, all students majoring in departments of this college (School of Business Administration; Departments of Biology, Chemistry, Economics, Education and Psychology, English, Health and Physical Education, History and Government, Journalism, Mathematics, Modern Languages, Oceanography and Meteorology, and Physics) must first demonstrate their ability to express themselves in acceptable English by passing a written examination in English composition. This examination must be taken not later than the spring semester of the junior year. Each student who fails to make a passing grade on a qualifying examination will be required to report to the Department of English for assignment for remedial work, which the student must complete satisfactorily without degree credit. Only if the Department of English has certified satisfactory completion of such remedial work and the student has passed his examination will the student be granted regular status as a candidate for a degree.

## **ELECTIVES**

In all curricula, elective hours are shown distributed over several semesters (one, two, or more a semester). The student is not expected to schedule his elective courses

only in the units listed. He is free to schedule electives in whatever units he chooses up to and beyond the total number of elective hours in his curriculum. A student will normally be expected to take electives in accordance with his academic classification.

It is recommended that most of the elective courses be in fields other than the major, and that the student take at least one course outside his major field during each semester of his junior and senior years. For example, where possible a student in one of the curricula in business administration should choose electives outside the School of Business Administration; the major in science should elect courses in the humanities and social sciences; and students in economics or history should elect courses in the natural sciences, in the humanities, and in business administration.

## THE HONORS PROGRAM

### The Purpose of Honors

The purpose of the Honors Program of the College of Arts and Sciences is to offer the superior student special opportunities for academic work of a range and depth appropriate to his capabilities and greater intellectual interests.

### Admission to the Program

Students are admitted to the Honors Program by invitation only, but inquiries from students are welcomed. Admission to one facet or another of the program can be made at any time in the student's career that he has demonstrated his ability to do superior work. Inquiries concerning the program may be addressed to Dr. Richard H. Ballinger, Chairman, Honors Committee, College of Arts and Sciences, Texas A&M University, College Station, Texas.

### General Nature of Work in Honors Sections

In general, honors sections are smaller than regular sections, and students participate more actively in class discussion. In honors sections, broader and more complex aspects of the subject are covered, and students have more opportunity for independent work. Grades assigned for work in honors sections are the same as the quality of work would merit if done in regular sections.

### Honors Colloquia for Freshmen

Honors colloquia provide the freshman student an opportunity to meet outstanding members of the faculty and to discuss ideas in an informal atmosphere. Discussions are based upon lectures or cultural events. Both visiting lecturers and lecturers from Texas A&M University will participate in colloquia. Colloquia in the freshman year present an introduction to the various disciplines of human knowledge: Liberal Arts 105 to the natural sciences and Liberal Arts 106 to the social sciences and the humanities.

## LATIN AMERICAN STUDIES

A number of departments offer courses relating to Latin America, so that it is possible for many students (including some who are registered in the other colleges of the University) to combine some concentration in Latin American studies with their regular department major. The program of offerings on Latin America is designed to meet the needs of four classes of students: (1) those who expect to enter into business in Latin America or into trade with Latin America; (2) those who contemplate a career in the foreign service of the United States Government or in any of the several government agencies in Washington which employ specialists on Latin America, with assignments both in the United States and in the foreign field; (3) those who expect to enter into teaching or research with emphasis upon Latin America; and (4) those who wish to broaden their education and acquire a better understanding of the people and the problems of Latin America. Any student who elects to coordinate some study of Latin America with a regular major in one of the University departments should consult the head of his major department for guidance in working out his program of study.

Those courses which bear directly on Latin America include the following:

Geog. 201 World Regional Geography  
 Geog. 303 Geog. of South America  
 Govt. 335 Govt. & Politics of Latin America  
 Hist. 341 South America to 1825  
 Hist. 342 South America Since Independence  
 Hist. 413 Mexico & Span. N.A., 1492 to 1821  
 Hist. 414 Hist. of Mexico, 1821 to Present

Hist. 422 Internatl. Rival. in Gulf-Carib. Area  
 M.L. 305 Modern Span.-Amer. Drama  
 M.L. 306 Modern Span.-Amer. Drama  
 M.L. 325 Pub. Spkg. in Spanish  
 M.L. 326 Pub. Spkg. in Spanish  
 M.L. 335 Spanish-American Novel  
 M.L. 336 Spanish-American Novel

## THE SCHOOL OF BUSINESS ADMINISTRATION

### PROFESSIONAL FIELDS OF STUDY

Accounting  
Finance

Management  
Marketing

### GENERAL STATEMENT

The several curricula in business administration provide professional training for business careers. The freshman and sophomore years are the same in all curricula. The student elects a major field at the beginning of the junior year choosing one of the following: accounting, finance, management, marketing.

Each curriculum contains courses essential to a general education and permits the study of fundamental business theory and procedure with limited specialization in one of the major fields. No more than twelve hours of elective courses in business administration will be counted toward a degree. Upon the completion of his chosen curriculum, the student will receive the degree of Bachelor of Business Administration.

The objectives of the programs in the School of Business Administration are to challenge the student's intellectual curiosity, to develop analytic ability, and to provide current business information that will enable the graduate to successfully meet the challenges of a dynamic business society. These objectives are carried out with a variety of classroom methods, experimental courses, and realistic case problems in business.

### BASIC BUSINESS ADMINISTRATION PROGRAM

The course of study for the first two years is the same for all business administration professional fields. This course of study is mostly humanities and sciences.

#### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 115 Survey of Biol.	4	B.A. 106 Business Organization	3
B.A. 105 Intr. to Business	3	Engl. 104 Composition & Rhetoric	3
Engl. 103 Composition & Rhetoric	3	Hist. 106 Hist. of United States	3
Hist. 105 Hist. of United States	3	Math. 110 Survey in Math.	3
Math. 102 Algebra	3	M.S. or A.S.	1
M.S. or A.S.	1	Science*	4
P.E. 101	R	P.E. 102	R
	17		17

#### SOPHOMORE YEAR

B.A. 211 Business Law	3	B.A. 212 Business Law	3
B.A. 227 Prin. of Accounting	4	B.A. 228 Prin. of Accounting	4
Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 212 Shakespeare	3	Engl. 231 or 232 Survey of Engl. Literature	3
M.S. or A.S.	1	Govt. 206 Amer. National Govt.	3
Psy. 303 Psy. for Teaching Students	3	M.S. or A.S.	1
P.E. 201	R	P.E. 202	R
	17		17

#### Curriculum in ACCOUNTING

The curriculum in accounting offers a professional course of training for employment in commercial and industrial accounting, public accounting, or governmental accounting. Positions in these fields are generally designated as accountant, public accountant, certified public accountant, tax accountant, auditor, cost accountant, internal auditor, and controller. The basic business training obtained in this curriculum also qualifies graduates for employment eventually leading to executive positions in industry.

#### FRESHMAN AND SOPHOMORE YEARS

(See above)

\*Students may elect one of the following: Chem. 106, Geol. 203, Geol. 205, Phys. 211.



## JUNIOR YEAR

First Semester	Credit	Second Semester	Credit
B.A. 303 Statistical Method	4	B.A. 304 Bus. Cycles and Bus. Meas.	3
B.A. 327 Intermed. Accounting	3	B.A. 328 Intermed. Accounting	3
B.A. 329 Elem. Cost. Accounting	3	B.A. 332 Cost Accounting	3
Econ. 311 Money & Banking	3	Elective	9
Elective	4		18
	17		

## SENIOR YEAR

B.A. 330 Adv. Accounting	3	B.A. 403 Income Tax	3
B.A. 341 Corp. Finance	3	Econ. 412 Public Finance	3
B.A. 407 Auditing	3	Elective	11
Spch. 403 Public Speaking	3		17
Elective	5		
	17		

Curriculum in  
FINANCE

The curriculum in finance provides instruction in the principles, methods, instruments, and institutions of finance with specialized training in the techniques and practices of financial management. The student receives training in accounting, economics, business law, and elective fields, which provides a balanced background for specialization in finance.

The principal objective of the program is to prepare students for managerial positions in such fields of business finance as commercial banking, investment banking, securities brokerage, trust management, and property management. The program also provides training for employment with governmental agencies engaged in lending operations and regulation of securities markets.

## FRESHMAN AND SOPHOMORE YEARS

(See page 96)

## JUNIOR YEAR

B.A. 303 Statistical Method	4	B.A. 304 Bus. Cycles & Bus. Meas.	3
B.A. 315 Insurance	3	B.A. 321 Marketing	3
B.A. 335 Administrative Accounting		B.A. 341 Corp. Finance	3
Or		Elective	9
Math. 215 Finite Math.	3		18
Econ. 311 Money & Banking	3		
Elective	4		
	17		

## SENIOR YEAR

B.A. 363 Prin. of Management	3	B.A. 434 Problems in Finance	3
B.A. 420 Prin. of Investment	3	B.A. 440 Real Estate Fund.	3
Spch. 403 Public Speaking	3	Econ. 412 Public Finance	3
Elective	8	Elective	8
	17		17

Curriculum in  
MANAGEMENT

The coordination of human effort to achieve a common goal is necessary in all organized activity regardless of the type of institution involved. The particular job of management is one of coordinating the activities of individual members and groups in an organization by planning, organizing, motivating, and controlling their activities.

Preparing students for business management positions which are not in the specific areas of accounting, marketing, finance, and production is the principal objective of the curriculum in management. The four aspects of the field of management—management analysis, organization theory, management principles, and human relations—are explored in order to aid the student develop managerial skills. The curriculum is designed to give the student a broad background in business education and also to expose him to complex management problems which demand expert skill for analysis and solution.

## FRESHMAN AND SOPHOMORE YEARS

(See page 96)

## JUNIOR YEAR

First Semester	Credit	Second Semester	Credit
B.A. 303 Statistical Method	4	B.A. 304 Bus. Cycles & Bus. Meas.	3
B.A. 321 Marketing	3	B.A. 335 Administrative Accounting	3
B.A. 363 Prin. of Management	3	Or	
Econ. 311 Money & Banking	3	Math. 215 Finite Math.	3
Elective	4	B.A. 341 Corp. Finance	3
	—	B.A. 422 Personnel Prob. of Ind.	3
	17	LEn. 403 Production Management	3
		Elective	3
			18

## SENIOR YEAR

B.A. 459 Management Problems	3	B.A. 423 Human Rel. in Business	3
Econ. 318 Econ. of Labor	3	B.A. 466 Management Policy	3
Spch. 403 Public Speaking	3	Elective	11
Elective	8		17
	17		

Curriculum in  
MARKETING

The field of marketing is diversified in the scope of its opportunities. Typical of the fields in which expansion is taking place is retail merchandising. Its major departments include store management, buying, publicity, merchandise planning, research, and personnel work. Market research will make increased demands upon those able to furnish management with the data necessary to keep abreast of marketing changes, to eliminate wasteful marketing methods, and to develop new products. The field of sales administration requires an ever-increasing number of individuals qualified to recruit, select, and train selling personnel. Also in this area lie the important functions of establishing sales territories, setting sales quotas, and sales costing. Personal selling is a field offering many opportunities for employment. In the field of advertising a student may gain added proficiency by electing advertising courses taught in the Department of Journalism.

By careful selection of electives, a student can specialize in one of the different fields of marketing or gain general knowledge in anticipation of starting his own business.

## FRESHMAN AND SOPHOMORE YEARS

(See page 96)

## JUNIOR YEAR

B.A. 303 Statistical Method	4	B.A. 304 Bus. Cycles & Bus. Meas.	3
B.A. 321 Marketing	3	B.A. 314 Advertising	3
B.A. 335 Administrative Accounting	3	B.A. 325 Retailing	3
Or		B.A. 341 Corp. Finance	3
Math. 215 Finite Math.	3	Econ. 311 Money & Banking	3
Geog. 204 Economic Geography	3	Elective	3
Elective	4		18
	17		

## SENIOR YEAR

B.A. 435 Salesmanship		B.A. 436 Sales Management	3
Or		Spch. 403 Public Speaking	3
B.A. 448 Marketing Problems	3	Elective	11
B.A. 445 Marketing Research	3		17
Elective	11		
	17		

## LIBERAL ARTS

The curricula in liberal arts leading to the degree of Bachelor of Arts offer carefully planned programs of study in selected areas of the humanities and social sciences. They are intended for students whose interests, abilities, and aims are better served by a broad general education than by more specialized technological and scientific studies.

After completing one of these curricula, many students enter directly upon their life work. Others make their liberal arts course the foundation for additional education in a professional or graduate school. Special provision is made for those who wish to begin the study of law before they have completed the program for the Bachelor's degree.

In all of the programs the first two years are given over to introductory work in fundamental subjects. The purpose is to enable the student to attain experience and breadth of view so that he may take a more intelligent part in his own further education. During the last two years the student pursues a major and a minor field of study and appropriate electives, with guidance from the head of his major department and from the Dean of the College of Arts and Sciences.

A student who is undecided as to a program of study will follow a modified liberal arts program as outlined below.

## FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
Science <sup>2</sup>	3 or 4	Science <sup>2</sup>	3 or 4
Elective <sup>3</sup>	3 or 4	Elective <sup>3</sup>	3 or 4
P.E. 101	R	P.E. 102	R
	16 or 18		16 or 18

- NOTES: 1. Based upon an analysis of his high school record and entrance tests, a student may be required to register for either a reduced load or for special courses.
2. The selection of a science course will be made in consultation with an advisor, depending upon the area of interest indicated by the student.
3. These elective hours are available to the student to explore any specialized area of interest to assist him in the selection of a course of study.

## MAJOR AND MINOR STUDIES

By April 15 of his sophomore year, the student selects a major and a minor field of study, according to the following directions:

1. One of the following subjects must be chosen as the field of major study: economics, English, history, journalism, mathematics, modern languages.
2. For his minor study the student may select one of the above subjects other than that of his major study or one of the following: biology, business administration, chemistry, education, entomology, geography, geology and geophysics, government, health and physical education, meteorology, physics, psychology, or sociology.
3. The remainder of the elective work may be taken in any of the areas of study indicated above, or in other departments of the University, subject to the approval of the Dean of Arts and Sciences.
4. To satisfy the requirements for graduation, a student must complete not less than thirty semester hours in his major study, of which at least twelve hours are in advanced courses (above the sophomore level), and not less than eighteen semester hours in his minor study, of which at least six hours are in advanced courses. Upon recommendation of the head of the student's major department, the Dean may authorize the substitution of courses in closely related departments for a limited number of hours in the major or minor study.

## FOREIGN LANGUAGE REQUIREMENT

The student will satisfy the foreign language requirement by completing four semesters of study in one language.

## THE SOPHOMORE SCIENCE REQUIREMENT

A student whose curriculum includes a sophomore science requirement may satisfy this requirement in one of three ways:



1. Normally, he will schedule any two (one each semester) of the following survey courses: Chem. 106, Geog. 203, Phys. 211.

2. Alternatively, he may substitute for the two survey courses any two-semester course in chemistry or physics.

3. By special permission of the Dean, he may be allowed to substitute the first semester of the usual two-semester introductory course in chemistry, geology, or physics for the survey course in that science. This last provision is intended to prevent unnecessary duplication in the program of students changing from one curriculum to another or transferring from another institution with science credit equivalent to an introductory rather than a survey course.

### Curriculum in ECONOMICS

Most students who major in economics enter upon a business career following their graduation. These students obtain a broad foundation for such a career by combining a judicious selection of courses in business administration with those prescribed in their major program. Other students find it desirable to obtain an undergraduate degree with a major in economics before entering law school. Still others pursue the four-year course in preparation for graduate study leading to careers in teaching, research, or government service.

#### FRESHMAN YEAR<sup>1</sup>

First Semester	Credit	Second Semester	Credit
Biol. 101 <sup>2</sup> Gen. Bot. of Seed Plants	3	Biol. 107 <sup>2</sup> Vertebrate Zoology	3
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>3</sup>	3	Modern Language <sup>3</sup>	3
P.E. 101	R	Elective	2
	16	P.E. 102	R
			18

#### SOPHOMORE YEAR

B.A. 227 Prin. of Accounting	4	B.A. 228 Prin. of Accounting	4
Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 212 Shakespeare	3	Engl. 231 or 232 Survey of Engl. Literature	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>3</sup>	3	Modern Language <sup>3</sup>	3
Science <sup>4</sup>	4	Science <sup>4</sup>	4
P.E. 201	R	P.E. 202	R
	18		18

#### JUNIOR YEAR

B.A. 303 Statistical Method	4	Econ. 311 Money & Banking	3
Econ. 323 Economic Analysis	3	Econ. 320 Econ. Development of Europe	3
Psy. 207 Gen. Psychology		Economics (elective)	3
Or		Govt. 206 Amer. National Govt.	3
Psy. 303 Psy. for Teaching Students	3	Elective <sup>5-6</sup>	5
Elective <sup>5-6</sup>	7		17
	17		

#### SENIOR YEAR

Econ. 410 Theory of Inc. & Employment	3	Economics (elective)	6
Economics (elective)	3	Spch. 403 Public Speaking	3
Elective	8	Elective	7
	17		16

NOTES: 1. The student planning his advanced course of study should consult promptly with the Head of the Department and prepare his degree plan.

2. Transfers who have credit for any 6 hours of college biology may substitute such credit for Biol. 101, 107.

3. See "The Foreign Language Requirement," page 99.

4. See "The Sophomore Science Requirement," page 99.

5. B.A. 304 or 341 can substitute for three semester hours of economic electives.

6. Junior and senior electives are to be selected after consultation with the student's major advisor.

## Curriculum in ENGLISH

The curriculum in English is designed for breadth in education. In the Department of English, the English major studies writing skills, the language, and literature. Outside of the Department of English, he studies physical and biological sciences, social sciences, foreign languages, history, and philosophy. A large part of the program, especially in the junior and senior years, is left to the choice of the student. Through electives the student may extend his knowledge in the humanities, sciences, social sciences, or even technological skills. The curriculum for the English major, then, is suitable not only for the student who expects to continue his studies of the humanities in graduate school but also for the student who expects to go into business or to become a student of law or medicine or religion.

The student desiring both a full professional training and a broad general education may in five years complete the requirements for two degrees—Bachelor of Arts in English and Bachelor of Science in any one of the professional fields. For specific degree plans, which are made out for each individual entering this program, the student should consult the Dean of Arts and Sciences and the dean of any other college in which he seeks a professional degree. (For degrees in English and in Engineering, see page 123.)

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 <sup>1</sup> Gen. Bot. of Seed Plants	3	Biol. 107 <sup>1</sup> Vertebrate Zoology	3
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>2</sup>	3	Modern Language <sup>2</sup>	3
P.E. 101	R	Elective	2
	—	P.E. 102	R
	16		—
			18

### SOPHOMORE YEAR

Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 231 Survey of Engl. Literature	3	Engl. 212 Shakespeare	3
Hist. 213 Hist. of England	3	Hist. 214 Hist. of England	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>2</sup>	3	Modern Language <sup>2</sup>	3
Science <sup>3</sup>	4	Science <sup>3</sup>	4
P.E. 201	R	P.E. 202	R
	—		—
	17		17

### JUNIOR YEAR

Engl. 321 19th Century Literature	3	English (elective)	3
Engl. 409 Intr. to Linguistics	3	Engl. 322 19th Century Literature	3
Or		Elective	12
Engl. 410 Hist. of English Lang.	3		—
Govt. 206 Amer. National Govt.	3		18
Elective	8		—
	—		—
	17		17

### SENIOR YEAR

English (elective)	3	English (elective)	3
Spch. 407 Oral Interpretation	3	Elective	14
Elective	11		—
	—		—
	17		17

NOTES: 1. Transfers who have credit for any 6 hours of college biology may substitute such credit for Biol. 101, 107.

2. See "The Foreign Language Requirement," page 99.

3. See "The Sophomore Science Requirement," page 99.

## Curriculum in GOVERNMENT

Courses in government are concerned with human society and the relations and institutions involved in man's existence and well-being as a member of an organized community. The manner in which a given society is governed is an important aspect of its general culture. Many considerations (economic, historical, sociological, psychological, religious, philosophical, and other factors) influence the political processes. For this reason a politically organized community must of necessity be a dynamic institution of man.

In its broadest concept within the liberal arts program, the study of government seeks to understand the way in which the rules and institutions of society are formulated, executed, and established. The center of interest may, depending upon the individual, be considered alternatively as the study of power, of government, of the state, or of human relations in their political context with a focus upon the solution of present-day problems in government. The study of government seeks to prepare the student either for the role of an active participant or leader in government and administration, or for the equally significant role of an informed citizen. Also, the program in instruction is designed to guide students in exploring and understanding political processes, and to lay a sound foundation for further study in government at the graduate level.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 <sup>1</sup> Gen. Bot. of Seed Plants	3	Biol. 107 <sup>1</sup> Vertebrate Zoology	3
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>2</sup>	3	Modern Language <sup>2</sup>	3
P.E. 101	R	Elective	2
	16	P.E. 102	R
			18

### SOPHOMORE YEAR

Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 212 Shakespeare	3	Engl. 231 or 232 Survey of Engl. Literature	3
Govt. 206 Amer. National Govt.	3	Govt. 207 State & Local Govt.	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>2</sup>	3	Modern Language <sup>2</sup>	3
Science <sup>3</sup>	4	Science <sup>3</sup>	4
P.E. 201	R	P.E. 202	R
	17		17

### JUNIOR YEAR

Government <sup>4</sup> (elective)	6	Government <sup>4</sup> (elective)	6
Hist. 213 <sup>5</sup> Hist. of England		Hist. 214 <sup>5</sup> Hist. of England	
Or		Or	
Hist. 217 <sup>5</sup> Development of Europe	3	Hist. 218 <sup>5</sup> Development of Europe	3
Elective <sup>6</sup>	8	Elective <sup>6</sup>	9
	17		18

### SENIOR YEAR

Government <sup>4</sup> (elective)	9	Government <sup>4</sup> (elective)	6
Spch. 403 Public Speaking	3	Elective <sup>6</sup>	11
Elective <sup>6</sup>	5		
	17		17

- NOTES: 1. Transfers who have credit for any 6 hours of college biology may substitute such credit for Biol. 101, 107.
2. See "The Foreign Language Requirement," page 99.
3. See "The Sophomore Science Requirement," page 99.
4. Of the 33 semester hours of Government courses required for the undergraduate degree in Government, at least 27 hours must be advanced and include at least one advanced course from each of four of the following five categories into which the department's work is divided: (a) Government, Politics, and Public Administration; (b) International Law, Relations, and Organizations; (c) Foreign and Comparative Government; (d) Political Theory; and (e) Public Law.



5. The student has the choice of taking either Hist. 213 and 214, or Hist. 217 and 218.
6. Depending upon the interest of the student and the objectives of his program of study, candidates for the Bachelor of Arts degree with a major in Government shall choose 24 semester hours of their electives from the following courses: Ag.Ec. 422; Biol. 325; B.A. 227, 228, 303; Econ. 311, 313, 320, 321, 324, 412; Educ. 421, 423, 444; Engl. 321, 322, 327, 328, 336, 371, 372; Geog. 203, 302, 303, 304, 320; Hist. 302, 315, 318 (or 423 and 424), 321 and 322, 331, 341 and 342, 410, 419; Jour. 406, 409, 465; advanced hours in any modern language, or at least 6 semester hours in a second modern language provided 12 semester hours are completed in one modern language; Phil. 381, 407; Psy. 207 or 302; Soc. 205, 320. Students who complete both the requirements for a teaching certificate and the senior ROTC program may substitute A.S. 401 and 402 or M.S. 421 and 422 for a like number of hours in the above enumerated electives; but A.S. 301 and 302, M.S. 321 and 322, and Educ. 425 must come from the remaining unrestricted elective hours.

The student should confine his minor to some field in the humanities or social sciences, or a related field. Any problem in developing the required number of hours for a minor should be discussed with the Head of the Department of History and Government.

### Curriculum in HISTORY

Through a major in history a student may provide the basis for a broad liberal education, and at the same time find a useful vocation or avocation. History majors find employment opportunities in public school teaching, museum and archives work, state and national park service, diplomatic and consular service, public relations and public information offices, and in writing, research, and bibliographical work.

Many students find it desirable to obtain an undergraduate degree with a major in history and a minor in some related field such as economics, English, government, modern languages, or sociology before entering law school, seminary training, regular military service, and certain careers in industry and government.

The program in history provides excellent preparation for the further study of history beyond the baccalaureate degree.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 <sup>1</sup> Gen. Bot. of Seed Plants	3	Biol. 107 <sup>1</sup> Vertebrate Zoology	3
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>2</sup>	3	Modern Language <sup>2</sup>	3
P.E. 101	R	Elective	2
	16	P.E. 102	R
			18

### SOPHOMORE YEAR

Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 212 Shakespeare	3	Engl. 231 or 232 Surv. of Engl. Literature	3
Hist. 217 Develop. of Europe	3	Hist. 218 Develop. of Europe	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>2</sup>	3	Modern Language <sup>2</sup>	3
Science <sup>3</sup>	4	Science <sup>3</sup>	4
P.E. 201	R	P.E. 202	R
	17		17

### JUNIOR YEAR

Govt. 206 Amer. National Govt.	3	Govt. 207 State & Local Govt.	3
History (elective)	6	History (elective)	6
Elective <sup>4</sup>	8	Elective <sup>4</sup>	9
	17		18

### SENIOR YEAR

History (elective)	6	History (elective)	3
Spch. 403 Public Speaking	3	Elective <sup>4</sup>	14
Elective <sup>4</sup>	8		17
	17		

- NOTES: 1. Transfers who have credit for any 6 hours of college biology may substitute such credit for Biol 101, 107.
2. See "The Foreign Language Requirement," page 99.
3. See "The Sophomore Science Requirement," page 99.
4. Effective for classes entering in September 1963 and thereafter. Depending upon the interest of the student and the objectives of his program of study, candidates for the Bachelor of Arts degree with a major in History shall choose 30 semester hours of their electives from the following categories: Ag.Ec. 422; Biol. 325; B.A. 227, 228, 303; Econ. 311, 318, 320, 321, 324, 412; Educ. 421, 423, 444; Engl. 321, 322, 327, 328, 336, 371, 372, 375, 376, 426; Geog. 203, 302, 303, 304, 320; Govt. 308, 310, 315, 320, 321, 325, 331, 333, 335, 425, 436, 441; Jour. 406, 409, 465; advanced hours in any modern language or at least 6 semester hours in a second modern language provided 12 semester hours are completed in one modern language; Phil. 381, 407; Psy. 207 or 302; Soc. 205, 320.

Students who complete both the requirements for a teaching certificate and the senior ROTC program may substitute A.S. 401 and 402, or M.S. 421 and 422 for a like number of hours in the above enumerated electives; but A.S. 301 and 302, and M.S. 321 and 322, and Educ. 425 must come from the remaining unrestricted elective hours.

The student should confine his minor to some field in the Humanities or Social Sciences, or related field. Any problem in developing the required number of hours for a minor should be discussed with the Head of the Department of History and Government.

## Curriculum in JOURNALISM

Programs for students majoring in journalism are designed to prepare them for futures in the communications field. By the beginning of the junior year each student determines, with the advice of his departmental advisor, what special phase of journalism he wishes to emphasize in his own program—community newspapers, urban newspapers, news-editorial work, advertising, publication management, industrial writing and editing, or radio-TV Journalism.

A major in agricultural journalism is available for students interested primarily in the field of technical journalism serving agriculture.

Upon completion of the curriculum, most students enter either the news or advertising departments of newspapers or magazines with some working with radio-television and some with industrial publications.

Students may also pursue a five-year program combining full professional training with a broad education to qualify for two degrees—the Bachelor of Science degree in a technical field, such as industrial technology, or Bachelor of Business Administration in Management concurrently with the Bachelor of Arts in Journalism.

## FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 115 Survey of Biology	4	Engl. 104 Composition & Rhetoric	3
Engl. 103 Composition & Rhetoric	3	Hist. 106 Hist. of United States	3
Hist. 105 Hist. of United States	3	Jour. 102 Communications Media & Prin.	2
Math. 102 Algebra	3	M.S. or A.S.	1
M.S. or A.S.	1	Modern Language <sup>1</sup>	3
Modern Language <sup>1</sup>	3	Science <sup>2</sup>	4
P.E. 101	R	P.E. 102	R
	17		16

## SOPHOMORE YEAR

Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 212 Shakespeare	3	Engl. 232 Surv. of Engl. Literature	3
Jour. 201 News Writing	3	Jour. 202 Beginning News Reporting	3
Math. 110 Surv. Course in Math.	3	Jour. 315 Photography	2
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>1</sup>	3	Modern Language <sup>1</sup>	3
Elective	2	Soc. 205 Prin. of Sociology	3
P.E. 201	R	P.E. 202	R
	18		18

## JUNIOR YEAR

Govt. 206 Amer. National Govt.	3	B.A. 211 Business Law	
Journalism (elective)	6	Or	
Elective	8	B.A. 321 Marketing	3
	17	English (elective) <sup>3</sup>	3
		Jour. 307 News Editing	3
		Journalism (elective)	3
		Elective	4
			16

## SUMMER WORK

Jour. 300; Summer Practice, ten weeks, required.

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
English (elective)	3	Jour. 420 Law of the Press	3
Govt. 207 State and Local Govt.	3	Journalism (elective)	6
Jour. 409 Hist. & Prin. of Journalism	3	Spch. 403 Public Speaking	3
Elective	9	Elective	6
	<hr/> 18		<hr/> 18

NOTES: 1. See "The Foreign Language Requirement," page 99.

- The student may select any one of the following: Chem. 106, Geog. 203, Geol. 205, Phys. 211.
- It is recommended that the student select any one of the following: Engl. 325, 328, 340, 350, 371, 375.
- The Journalism Department has assembled information on the various areas of emphasis which will prove a valuable guide to a student planning his advanced course of study and choosing his electives at the beginning of the junior year.
- The Journalism Department, in cooperation with the daily newspaper, radio and television stations, and magazines of the area, offers a 10-week professional internship program for selected students who have demonstrated superior ability. These internships are available during the summer following the junior year.
- For further information on agricultural journalism, see page 99.

Curriculum in  
MATHEMATICS

The curriculum in the Department of Mathematics is designed to give the student a broad liberal education as well as to provide him with the essentials for a career in mathematics.

The demand for pure mathematicians as well as applied mathematicians has recently become very great in industry, government, and university work. This demand is found at the bachelor's, master's, and doctor's levels. The Department of Mathematics offers programs in pure and applied mathematics, including numerical analysis, to help meet this demand.

## FRESHMAN YEAR

Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Math. 121 Anal. Geom. & Calculus	4
Math. 102 Algebra	3	M.S. or A.S.	1
Math. 103 Plane Trigonometry	3	Phys. 218 Mechanics & Heat	4
M.S. or A.S.	1	P.E. 102	R
P.E. 101	R		<hr/> 16
	<hr/> 17		

## SOPHOMORE YEAR

Biol. 115 Survey of Biology	4	Engl. 231 or 232 Surv. of Engl. Literature	3
Engl. 212 Shakespeare	3	Hist. 106 Hist. of United States	3
Math. 122 Calculus	4	Math. 307 Calculus	3
M.S. or A.S.	1	M.S. or A.S.	1
Mod. Lang. Fr., Germ., Russ., or Span.	3	Mod. Lang. Fr., Germ., Russ., or Span.	3
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	<hr/> 19		<hr/> 17

## JUNIOR YEAR

Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Govt. 206 Amer. National Govt.	3	Mathematics (elective)	6
Math. 308 Differential Equations	3	Mod. Lang. Fr., Germ., Russ., or Span.	3
Mod. Lang. Fr., Germ., Russ., or Span.	3	Elective	5
Elective	5		<hr/> 17
	<hr/> 17		



## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Mathematics (elective)	3	Mathematics (elective)	3
Spch. 403 Public Speaking	3	Elective	14
Elective	11		17
	17		

NOTES: 1. The minor field of study should be chosen only after consultation with the Head of the Department of Mathematics, who will help the student arrange a program appropriate to his plans following graduation.

2. Students planning to enter the Graduate College should elect Math. 409 and 415.

Curriculum in  
MODERN LANGUAGES

## FRESHMAN YEAR

Biol. 101 <sup>1</sup>	3	Biol. 107 <sup>1</sup>	3
Gen. Bot. of Seed Plants	3	Vertebrate Zoology	3
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
Mod. Lang. Spanish	3	Mod. Lang. Spanish	3
P.E. 101	R	Elective	2
	16	P.E. 102	R
			18

## SOPHOMORE YEAR

Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 212 Shakespeare	3	Engl. 231 or 232 Surv. of Engl. Literature	3
M.S. or A.S.	1	M.S. or A.S.	1
Mod. Lang. Spanish	3	Mod. Lang. Spanish	3
Science <sup>2</sup>	4	Science <sup>2</sup>	4
Elective <sup>3</sup>	3	Elective <sup>3</sup>	3
P.E. 201	R	P.E. 202	R
	17		17

## JUNIOR YEAR

Engl. 410 Hist. of Engl. Language	3	Engl. 409 Intr. to Linguistics	3
Govt. 206 Amer. National Govt.	3	Mod. Lang. Spanish	3
Mod. Lang. Spanish	3	Mod. Lang. Fr., Germ., or Russ.	3
Mod. Lang. Fr., Germ., or Russ.	3	Elective	9
Elective	5		18
	17		

## SENIOR YEAR

History <sup>4</sup> Latin America	3	History <sup>4</sup> Latin America	3
Mod. Lang. Fr., Germ., or Russ.	3	Mod. Lang. Fr., Germ., or Russ.	3
Mod. Lang. Spanish	2	Mod. Lang. Spanish	2
Spch. 403 Public Speaking	3	Elective	9
Elective	6		17
	17		

NOTES: 1. Transfers who have credit for any 6 hours of college biology may substitute such credit for Biology 101, 107.

2. See "The Sophomore Science Requirement," page 99.

3. Students who intend to take three years of French, German, or Russian will begin the study of that language in the sophomore year in place of the elective 3 hours.

4. Either 6 hours of History of South America, 341 and 342; or 6 hours of History of Mexico, 413 and 414.

5. Students who begin the study of Spanish with M.L. 105 will take a 3-hour course in literature in the senior year and reduce electives by 3 hours.

6. Recommended electives: Advanced courses in economics, English, geography, history.

7. For most students majoring in modern languages, economics, English, geography, or history are logical minors.

### Curriculum in PRE-LAW

It is becoming increasingly common for students to have completed a baccalaureate degree prior to commencing the study of law. Beginning with the entering class of June 1965, all applicants for admission to the University of Texas School of Law will be required to have a baccalaureate degree from an accredited college or university, as well as an acceptable score on the Law School Admission Test.

Students who plan to obtain an undergraduate degree before undertaking the study of law will normally register for one of the regular degree programs, and will find it advisable to include among their elective hours B.A. 227, Govt. 308, and Hist. 213 and 214. Particularly appropriate are the programs in business administration, economics, English, and history. Students who plan to complete no more than three years of undergraduate work before entering law school will matriculate in the three-year preparatory program listed below. Any student who completes this program may still earn a Bachelor of Arts degree with a major in history and a minor in economics by completing one additional year of course work as follows: Econ. 321, 324; 12 semester hours of history selected from Hist. 302, 315, 318 (or 423 and 424), 331, 411, and 421; Spch. 403; and 16 hours of electives, including, if possible, B.A. 303.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 <sup>1</sup> Gen. Bot. of Seed Plants	3	Biol. 107 Vertebrate Zoology	3
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
Mod. Lang. <sup>1</sup> Fr., Germ., or Span.	3	Mod. Lang. <sup>1</sup> Fr., Germ., or Span.	3
P.E. 101	R	Elective	1
	16	P.E. 102	R
			17

### SOPHOMORE YEAR

B.A. 227 Prin. of Accounting	4	B.A. 228 Prin. of Accounting	4
Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 212 Shakespeare	3	Engl. 231 or 232 Surv. of Engl. Literature	3
M.S. or A.S.	1	M.S. or A.S.	1
Mod. Lang. <sup>1</sup> Fr., Germ., or Span.	3	Mod. Lang. <sup>1</sup> Fr., Germ., or Span.	3
Science <sup>2</sup>	4	Science <sup>2</sup>	4
P.E. 201	R	P.E. 202	R
	18		18

### JUNIOR YEAR

Econ. 311 Money & Banking	3	Econ. 412 Public Finance	3
Govt. 206 Amer. National Govt.	3	Govt. 207 State and Local Govt.	3
Hist. 213 Hist. of England	3	Govt. 308 U. S. Constitutional Dev.	3
Phil. 301 Intr. to Philosophy	3	Hist. 214 Hist. of England	3
Psy. 207 Gen. Psychology	3	Elective	6
Elective	3		18
	18		

NOTES: 1. See "The Foreign Language Requirement," page 99.

- To satisfy the requirement in physical science, the student may choose one of the following: Chem. 101, 102 or Phys. 201, 202.
- The American Bar Association minimum requirement for admission to an accredited law school is three years of acceptable college work. Students who plan to seek admission to a law school after completing the three-year program listed above are strongly advised to check the program with the registrar of the school of their choice before beginning the third year. If necessary to meet specific requirements, substitutions may be approved by the Dean of the College of Arts and Sciences.

Students planning to attend the Law School of the University of Texas must use the 6 semester hours of elective in the junior year for advanced courses (300-400 level) in economics, government, history, or sociology.

- A student may qualify for the Bachelor of Arts degree from the Texas A&M University by completing the three-year pre-law curriculum here and at least one year at an accredited law school, with a minimum of 137 acceptable semester hours, subject to the usual grade point requirement.

## PSYCHOLOGY AND PREPARATION FOR TEACHING

### Curriculum in PSYCHOLOGY

The degree program in psychology provides the necessary background for subsequent professional training at the graduate level, especially in the fields of industrial and experimental psychology. Alternately, it offers a broad scientific base for on-the-job training in the armed services or in industry.

#### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 107 <sup>1</sup> Vertebrate Zoology	3	Biol. (elective) <sup>1</sup>	3
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
Elective	4	Elective	4
P.E. 101	R	P.E. 102	R
	17		17

#### SOPHOMORE YEAR

Econ. 203 Prin. of Economics	3	Econ. 204 Prin. of Economics	3
Engl. 212 Shakespeare	3	English (Literature elective)	3
Math. 104 Analytic Geometry	3	Govt. 206 Amer. National Govt.	3
M.S. or A.S.	1	M.S. or A.S.	1
Psy. 207 <sup>2</sup> Gen. Psychology	3	Psychology (elective)	3
Science (Physical) <sup>3</sup>	4	Science (Physical) <sup>3</sup>	4
P.E. 201	R	P.E. 202	R
	17		17

#### JUNIOR YEAR

Econ. 318 Economics of Labor	3	Educ. 439 <sup>4</sup> Educ. Statistics	3
Psy. 309 Differential Psy.	3	Engl. 301 Writing for Prof. Men	3
Psychology (elective)	3	Psy. 406 Psy. of Learning	3
Soc. 205 Prin. of Sociology	3	Soc. 411 <sup>4</sup> Social Psychology	3
Or		Elective	5
Soc. 206 Social Inst. & Processes	3		—
Elective	6		17
	18		

#### SENIOR YEAR

I.En. 404 Motion & Time Study	3	Psy. 401 Industrial Psy.	3
Psy. 403 Dynam. of Human Behavior	3	Psy. 408 Experimental Psy.	3
Psychology (elective)	3	Elective	11
Elective	8		—
	17		17

NOTES: 1. If a transfer student has received credit for Biol. 115, he may enroll in Biol. 330 or Biol. 337, and meet the minimum requirement in biology. Transfers who have credit for any 6 hours of college biology may substitute such credit for Biol. 107 and the general elective in biology.

2. Psy. 303 may be substituted for Psy. 207.

3. A two-semester sequence course is required in physics or chemistry to meet the requirement in physical science.

4. Educ. 439 and Soc. 411 will count as hours in psychology.

5. Majors in psychology will select a minor area of concentration of 18 hours, at least 6 of which must be of advanced level.

### EDUCATION: PREPARATION FOR TEACHING

The Department of Education and Psychology offers a program in teacher education leading to the degree of either Bachelor of Science or Bachelor of Arts. The Bachelor of Arts degree requires twelve hours of modern language. Students desiring to teach in the public schools may choose to major either in education or in a subject-matter area such as biology or mathematics. Programs for both elementary and secondary school teaching are available.



Candidates for work in the teacher education fields should select their courses under the guidance of a departmental advisor. Students may be eligible to receive a teaching certificate upon completing the requirements for the Bachelor's degree and being recommended by the Department to the Texas Education Agency through the University's Council on Teacher Education. Completion of the requirements for the Bachelor's degree does not automatically assure the student that he will be recommended for a teaching certificate.

The Department of Education and Psychology also offers advanced undergraduate and graduate courses in preparation for certification at the professional level as classroom teachers, visiting teachers, counselors, supervisors, principals, and superintendents. To meet the requirements for the professional certificate, the student must have at least three years of successful teaching experience and must have completed an approved program of at least 30 semester hours of graduate work beyond the Bachelor's degree requirements.

Graduate work toward the professional certificate may be incorporated in a program for an advanced degree. The Department offers the following advanced degrees: Master of Science, Master of Education, and Doctor of Philosophy with options in either Educational Administration or Curriculum and Instruction. Further information about these degrees may be obtained from the Graduate College.

A student majoring in education or working toward the provisional or the professional certificate will be assigned an advisor who will counsel with him during his teacher education program. Before being fully admitted to a teacher education program, each student must file formal application for admission into teacher education. Formal admission is contingent upon a review of the student's academic and disciplinary records, a recommendation from his high school principal or counselor, a review of current test results, and a personal interview with a counselor in the Department.

## MAJORS IN EDUCATION

Education majors will follow the program outlined below.

### I. Academic Foundations

The academic foundations consist of 60 semester hours which constitute the basic institutional requirements for the Bachelor's degree. Included are at least 12 semester hours of English, 6 semester hours of American history, 3-6 hours of government, and 12 semester hours from two of the following: science, mathematics, foreign language.

### II. Academic Specialization

Three programs are offered. Programs 1 and 2 are secondary school plans. Program 3 is for those wishing to teach in the elementary school, grades one through eight. The student should select the program which will best serve his professional objectives.

**Program 1.** The student must complete at least 24 semester hours of concentration in each of two subject-matter areas identified with a field of teaching in the secondary schools (12 advanced hours in each). Teaching fields may be selected from the following: biology, business, chemistry, English, geography, government, health and physical education, history, journalism, mathematics, physics, and Spanish. The exact courses to be taken will be chosen with the guidance of the student's advisor and the approval of the head of the department concerned.

**Program 2.** The student must complete at least 48 semester hours in a composite secondary teaching field such as social studies or general science (18 advanced hours).

**Program 3.** Students wishing to teach in elementary school must complete at least 18 semester hours (9 semester hours advanced credit) in one of the following areas: biology, chemistry, physics, mathematics, English, history, geography, or modern language. The student must also complete an additional 18 semester hours from among content areas related to the elementary school curriculum including: art, music, geography, speech, health and physical education, with electives from the fields of English, history, and science.

### III. Professional Development

The professional development program consists of academic course work paralleled by direct contacts with youth in school, home, and community. This program includes observations made in connection with courses in psychology, instructional methods,

curriculum, and testing. Serving as the capstone of the professional development program is supervised student teaching. During his student teaching, the student will assume the responsibilities for teaching elementary or secondary school classes. This work will be carried out under the joint supervision of a professional classroom teacher and a college supervisor who is a regular member of the faculty of the Department of Education and Psychology. Student teaching may not be taken prior to the student's senior year. Application for enrollment in student teaching must be made the semester prior to enrollment and approved by the student's advisor. The typical professional development program follows: Foundations in American Education (3 hrs.), Educational Psychology (3 hrs.), History and Philosophy of Education (3 hrs.), Child or Adolescent Psychology (3 hrs.), Elementary or Secondary School Curriculum (3 hrs.), Principles and Practices of Teaching (3 hrs.), Professional Electives (6 hrs.), Supervised Student Teaching (6 hrs.).

IV. Electives

With the approval of his advisor, the student will select electives to satisfy the requirements of a total of 137 semester hours for the Bachelor's degree in Arts and Sciences.

The complete curriculum for education majors is outlined below.

MAJORS IN AREAS OTHER THAN EDUCATION

Students majoring in subject-matter departments and working toward a teaching certificate must meet the minimum requirements described below:

I. Academic Foundations

Requirements are the same as those for education majors.

II. Academic Specialization

Requirements are the same as those for education majors.

III. Professional Development

The following eighteen semester hours of professional development courses are required of students working toward a secondary school certificate: Principles and Practices of Teaching (3 hrs.), Psychology for Secondary School Teachers (3 hrs.), History and Philosophy of Education (3 hrs.), Secondary School Curriculum (3 hrs.), Supervised Student Teaching (6 hrs.).

Students working on an elementary school certificate are required to complete the following 30 semester hours of professional development courses: Language Arts in the Elementary School (3 hrs.), Mathematics in the Elementary School (3 hrs.), Social Studies in the Elementary School (3 hrs.), Science in the Elementary School (3 hrs.), Educational Psychology (3 hrs.), Child Growth and Development (3 hrs.), Principles and Practices of Teaching (3 hrs.), Elementary School Curriculum (3 hrs.), Supervised Student Teaching (6 hrs.).

IV. Electives

Additional courses in either professional development or in academic specialization may be elected by the student.

Curriculum in  
EDUCATION

FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 Gen. Bot. of Seed Plants	3	Biol. 107 Vertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	
M.S. or A.S.	1	Or	
P.E. 101	R	Math. 110 Survey in Math.	3
	—	M.S. or A.S.	1
	17	Elective	1
		P.E. 102	R
			—
			18

## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Educ. 215 Found. of Amer. Educ.	3	Econ. 203 Prin. of Economics	3
Engl. 203 Intr. to Literature		English (elective)	3
Or		M.S. or A.S.	1
Engl. 210 Intr. to Logical Discourse	3	Psy. 301 Educational Psy.	3
M.S. or A.S.	1	Elective	7
Psy. 207 Gen. Psychology	3	P.E. 202	R
Elective	7		17
P.E. 201	R		
	17		

## JUNIOR YEAR

Education (elective)	3	Govt. 207 State & Local Govt.	3
Govt. 206 Amer. National Govt.	3	Psy. 323 Psy. of Adolescence	3
P.E. 213 Intr. to Health & P.E.	3	Soc. 206 Soc. Inst. & Processes	3
Elective	9	Elective	9
	18		18

## SENIOR YEAR

Educ. 421 Hist. & Phil. of Educ.	3	Educ. 425 Supervised Student Tchg.	6
Educ. 423 Prin. & Prac. of Tchg.	3	Educ. 444 Sec. School Curriculum	3
Education (elective)	3	Spch. 403 Public Speaking	3
H.E. 415 Sec. School Health Educ.	3	Elective	2
Elective	6		14
	18		

NOTES: 1. With the consent of the student's advisor, the following substitutions may be made in the program outlined above:

- Biological Sciences. A minimum of 6 hours of biological science is required. For Biol. 101 and 107, students may substitute Biol. 115 and either 330 or 337.
  - Physical Science. A minimum of 8 hours of physical science is required. For Chem. 101 and 102, students may substitute Phys. 201 and 202, or select 8 hours from these courses: Chem. 106, Phys. 211, Geol. 205, and Geog. 203.
  - Educ. 215. A student entering upon a certificate or degree program with junior or senior classification may substitute a more advanced course in education for Educ. 215.
  - P.E. 213, H.E. 415. A student may substitute approved courses in his teaching major or minor for P.E. 213 and/or H.E. 415.
- The English elective in the sophomore year should be chosen from literature courses. Students planning to teach English in the secondary schools may substitute for Engl. 203 or 210 a 3-hour English course chosen with the consent of the advisor. If a student writes unsatisfactorily, he may be required to take an additional course in writing, such as Engl. 301.
  - In choosing electives, the student should keep in mind the requirements of his subject-matter area of teaching specialization.
  - The following substitutions are permitted if approved by the student's advisor: Psy. 307 for Psy. 323; Educ. 443 for Educ. 444; H.E. 421 for H.E. 415.

## HEALTH AND PHYSICAL EDUCATION

The Department of Health and Physical Education offers a major for the student interested in a career as a: (1) physical education teacher in secondary or elementary schools; (2) athletic coach of an interschool sport; (3) athletic trainer; or (4) corrective therapist. The Bachelor's degree is granted students who complete the prescribed program of studies, and establish a second teaching major in one of the usual secondary school subject matter fields. The choice of a second teaching major may be made only with the approval of the Head of the Department of Health and Physical Education.

Upon completion of the prescribed curriculum and recommendation to the Texas Education Agency, the student will be eligible for (1) the Secondary School Certificate with teaching fields in Health and Physical Education and the selected second subject area and (2) the All-Grade Level Certificate in Health and Physical Education.

## Corrective Therapy

This program is offered in cooperation with the Veterans Administration to prepare specialists in rehabilitation through corrective therapy. This program includes a six-week clinical training period at the Veterans Administration Hospital in Houston. Graduates of this program find employment opportunities with the Veterans Administration, private hospitals, or other organizations concerned with physical rehabilitation.



## Curriculum in PHYSICAL EDUCATION

### FRESHMAN YEAR

First Semester		Credit	Second Semester		Credit
Biol. 101	Gen. Bot. of Seed Plants	3	Biol. 107	Vertebrate Zoology	3
Engl. 103	Composition & Rhetoric	3	Engl. 104	Composition & Rhetoric	3
Hist. 105 <sup>1</sup>	Hist. of United States	3	Hist. 106 <sup>1</sup>	Hist. of United States	3
Math. 102	Algebra	3	M.S. or A.S.		1
M.S. or A.S.		1	P.E. 212	P.E. Activities	2
Soc. 205	Prin. of Sociology	3	Science <sup>2</sup>		4
P.E. 101		R	P.E. 102		R
		—			—
		16			16

### SOPHOMORE YEAR

Biol. 219	Mammalian Anatomy	3	Biol. 220	Physiol. & Hygiene	3
Econ. 203	Prin. of Economics	3	English <sup>3</sup>	(elective)	3
English <sup>3</sup>	(elective)	3	Govt. 207	State & Local Govt.	3
Govt. 206	Amer. National Govt.	3	H.E. 218	Athletic Injuries	2
M.S. or A.S.		1	M.S. or A.S.		1
P.E. 211	P.E. Activities	2	P.E. 221	Safety Education	2
P.E. 213	Intr. to Health & P.E.	3	P.E. 317	Coaching of Football	2
P.E. 201		R	Elective		2
		—	P.E. 202		R
		18			—
					18

### JUNIOR YEAR

H.E. 216	First Aid	1	Educ. 423	Prin. & Pract. of Tchg.	3
H.E. 415	Sec. Sch. Health Educ.	3	H.E. 421	Elem. Sch. Health Educ.	3
P.E. 316	Sec. School P.E.	3	P.E. 315	Elem. School P.E.	3
P.E. 427	Therapeutic Prin.	3	Psy. 307	Child Growth & Development	3
Psy. 301	Educational Psy.	3	Elective		6
Elective		5			—
		18			18

### SENIOR YEAR

P.E. 423	Admin. of Health & P.E.	3	Education (elective) <sup>4</sup>		3
P.E. 425	Tests & Measurements	3	P.E. 450	Directed Teaching	6
Psy. 323	Psy. of Adolescence	3	Spch. 403	Public Speaking	3
Elective		9	Elective		3
		—			—
		18			15

NOTES: 1. Hist. 325, 326 may be substituted for Hist. 105, 106.

2. Students may elect either Chem. 106, Geog. 203, Geol. 205, or Phys. 211.

3. Any 6 hours of literature courses may be elected.

4. Elective in Education may be chosen from: Educ. 421, 427, 439.

### SCIENCE

Science programs in the College of Arts and Sciences are administered by the following departments: Biology, Chemistry, Oceanography and Meteorology, and Physics.

Recently approved is a College of Geosciences, composed of the Departments of Geology and Geography, Geophysics, Meteorology, and Oceanography. It will become an integral part of the academic divisions as soon as a reorganization of the existing areas of instruction in these sciences has been effected.

The several curricula in science are planned for those students whose interests and abilities lie in the direction of seeking scientific truths and relations previously unknown or not understood in the world about us and of bringing these truths to bear on problems affecting the well-being of mankind. Because many students do not discover the nature of their interests or abilities until they have followed a curriculum in agriculture or engineering for a year or more, the curricula in science are so arranged that a student may change to science with a minimum of loss in semester hour credit.

The curricula are designed to serve the following purposes:

1. To prepare students for research in basic science, usually after further study at the graduate level.
2. To prepare teachers of science in secondary schools and other institutions of learning.
3. To provide the necessary undergraduate foundation for students planning to study medicine or kindred fields.
4. To afford a broad scientific training for students who desire it before entering some field of applied science in industry or government service.

### Curriculum in BOTANY

The curriculum in botany is designed to provide the student with a sound background in the basic concepts of the science and supporting fields. It is designed to lead to graduate studies and a career in one of the various botanical sciences, either in research or college teaching or both. Students earning bachelor's degrees in botany are equipped for high school teaching or work in the various botanical sciences.

#### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 107 Vertebrate Zoology	3	Biol. 108 Invertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	Elective	1
	17	P.E. 102	R
			18

#### SOPHOMORE YEAR

Biol. 101 Gen. Bot. of Seed Plants	3	Biol. 102 Tax. of Flower. Plants	3
Chem. 316 Quant. Analysis	2	Biol. 327 Fund. Plant Morphol.	3
Chem. 319 Quant. Anal. Lab.	2	Chem. 317 Quant. Analysis	2
Engl. 203 Intr. to Literature	3	Chem. 320 Instrum. Anal. Lab.	2
Math. 104 Analytic Geometry	3	Engl. 210 Intr. to Logical Discourse	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 201 College Physics	4	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	18		18

#### JUNIOR YEAR

Biol. 206 Intr. Microbiology	3	Chem. 228 Organic Chemistry	4
Chem. 227 Organic Chemistry	4	Gen. 301 Genetics	4
Geog. 203 Physical Geography	4	Mod. Lang. French or German	3
Mod. Lang. French or German	3	P.P.P. 313 Intr. to Plant Physiol.	3
Elective	3	Elective	3
	17		17

#### SENIOR YEAR

Biol. 453 Plant Anatomy	3	Biol. 482 Seminar	1
Biol. 481 Seminar	1	Biology (Botany elective)	3
Econ. 203 Prin. of Economics	3	Mod. Lang. French or German	3
Govt. 206 Amer. National Govt.	3	Spch. 403 Public Speaking	3
Mod. Lang. French or German	3	Stat. 406 Statistical Methods	3
Elective	4	Elective	4
	17		17

## Curriculum in CHEMISTRY

The Department of Chemistry offers training in the various branches of chemistry for the degrees of Bachelor of Science, Master of Science, and Doctor of Philosophy.

Undergraduate programs are so arranged that a student in chemistry has a solid foundation in all phases of chemistry. The student whose goal is research is strongly advised to consider advanced degrees.

Employment opportunities for graduates at all degree levels are excellent. Graduates find such opportunities in teaching, laboratory, and industrial applications.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Chem. 103 <sup>1</sup> Chemical Principles	4	Chem. 104 <sup>1</sup> Chemical Principles	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Math. 121 Anal. Geom. & Calculus	4
Math. 102 Algebra	3	M.S. or A.S.	1
Math. 103 Plane Trigonometry	3	Phys. 218 Mechanics & Heat	4
M.S. or A.S.	1	P.E. 102	R
P.E. 101	R		--
	17		16

### SOPHOMORE YEAR

Biol. 115 Survey of Biology	4	Chem. 228 Organic Chemistry	4
Chem. 226 Chemical Calculations	2	Engl. 210 Intr. to Logical Discourse	3
Chem. 227 Organic Chemistry	4	Hist. 106 Hist. of United States	3
Math. 122 Calculus	4	Math. 307 Calculus	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	19		18

### JUNIOR YEAR

Chem. 316 Quantitative Analysis	2	Chem. 317 Quantitative Analysis	2
Chem. 319 Quant. Anal. Lab.	2	Chem. 320 Instrum. Anal. Lab.	2
Chem. 323 Physical Chemistry	3	Chem. 324 Physical Chemistry	3
Chem. 325 Phys. Chem. Lab.	1	Chem. 326 Phys. Chem. Lab.	1
Econ. 203 Prin. of Economics	3	Chem. 380 Chemical Bibliog.	1
Mod. Lang. <sup>2</sup> French or German	3	Engl. 203 Intr. to Literature	3
Elective	3	Mod. Lang. <sup>2</sup> French or German	3
	17	Elective	1
			16

### SENIOR YEAR

Chem. 447 Qual. Organ. Analysis	4	Chem. 464 Nuclear & Radiochem.	3
Chem. 461 Physical Chemistry	3	Chem. 481 Seminar	1
Chem. 462 Inorganic Chemistry	3	Govt. 206 Amer. National Govt.	3
Engl. 301 Writing for Prof. Men	3	Mod. Lang. <sup>2</sup> French or German	3
Mod. Lang. <sup>2</sup> French or German	3	Elective	6
Elective	2		16
	18		

- NOTES: 1. Students not meeting the requirements for Chem. 103, 104 may substitute Chem. 101, 102.
2. See "The Foreign Language Requirement," page 99.
3. A program combining the basic requirements for a Bachelor of Science degree in chemistry with premedical requirements is available. Students completing this four-year program will receive a degree certified by the American Chemical Society and at the same time satisfy all the premedical requirements. Mimeographed copies of this program are available at the Department of Chemistry and from the Chairman of the College Premedical Committee in the Department of Biology.



### Curriculum in ENTOMOLOGY

The curriculum in entomology in the College of Arts and Sciences is designed for those students who wish to major in the science but are desirous of obtaining more basic training in biology, chemistry, physics, and mathematics than is provided for in the curriculum of the College of Agriculture. Foreign language is also required. Upon graduation the students are well prepared for graduate studies and have excellent training for careers in research, teaching, business, or industry.

#### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 107 Vertebrate Zoology	3	Biol. 108 Invertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	Elective	1
	17	P.E. 102	R
			18

#### SOPHOMORE YEAR

Biol. 101 Gen. Bot. of Seed Plants	3	Biol. 206 Intr. Microbiology	3
Engl. 212 Shakespeare	3	Econ. 203 Prin. of Economics	3
Ento. 201 Gen. Entomology	3	Engl. 231 or 232 Surv. of Engl. Literature	3
M.S. or A.S.	1	M.S. or A.S.	1
Mod. Lang. <sup>1</sup>	3	Mod. Lang. <sup>1</sup>	3
Phys. 201 College Physics	4	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	17		17

#### JUNIOR YEAR

Chem. 227 Organic Chemistry	4	Chem. 228 Organic Chemistry	4
Ento. 301 Systematic Entomology	3	Engl. 301 Writing for Prof. Men	3
Ento. 305 Insect Morphology	3	Ento. 302 Systematic Entomology	3
Mod. Lang. <sup>1</sup>	3	Ento. 306 Insect Physiology	3
Elective	3	Mod. Lang. <sup>1</sup>	3
	16	Elective	2
			18

#### SENIOR YEAR

Ento. 401 Prin. of Insect Control	3	Ento. 402 Gen. Economic Entomology	3
Ento. 423 Comp. Anat. of Arth.	3	Ento. 424 Insect Ecology	3
P.P.P. 301 Plant Pathology	3	Gen. 301 Genetics	4
Spch. 403 Public Speaking	3	Govt. 206 Amer. National Govt.	3
Elective	5	Elective	4
	17		17

NOTES: 1. See "The Foreign Language Requirement," page 99.

2. Elective hours and the remaining hours for the major should be selected from the elective courses following the zoology curriculum, page 99.

### Curriculum in METEOROLOGY

Meteorology is the science of planetary atmospheres and their phenomena. Within the broad field of geophysics, it is concerned with physical and chemical processes and states within the earth's atmosphere and at the earth's surface. The objective of terrestrial meteorology is to determine the natural and physicochemical controls of the atmosphere and to apply this knowledge in various ways benefiting life and human endeavor.

Weather and climate through the ages have shaped the physical and biological features of the earth and have guided the course of human activities. However, it is only through quite recent, and continuing, developments in technology, communications, and transportation that sufficient information has been obtained about the atmosphere to enable meteorology to emerge as a separate college or university study. While satisfying public interest in the weather has been the major objective in meteorology, the last few years have witnessed rapidly expanding applications in agriculture, engineering, industry, business, commerce, space exploration and travel, and national defense.

For classes entering in September 1963 and thereafter

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 115 Survey of Biology	4	Chem. 102 Gen. Chemistry	4
Chem. 101 Gen. Chemistry	4	Engl. 104 Composition & Rhetoric	3
Engl. 103 Composition & Rhetoric	3	Math. 122 Calculus	4
Math. 121 Anal. Geom. & Calculus	4	M.S. or A.S.	1
M.S. or A.S.	1	Phys. 218 Mechanics & Heat	4
P.E. 101	R	P.E. 102	R
	16		16

### SOPHOMORE YEAR

Engl. 212 Shakespeare	3	Hist. 106 Hist. of United States	3
Hist. 105 Hist. of United States	3	Math. 308 Differential Equations	3
Math. 307 Calculus	3	Met. 305 Gen. Meteorology	3
M.S. or A.S.	1	M.S. or A.S.	1
Mod. Lang.	3	Mod. Lang.	3
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	17		17

### JUNIOR YEAR

Econ. 203 Prin. of Economics	3	Met. 324 Phys. & Reg. Climatol.	3
Govt. 206 Amer. National Govt.	3	Met. 336 Atmospheric Motions	3
Met. 315 Met. Instrum. & Observ.	4	Met. 451 Fund. of Meteorol. Anal.	4
Met. 335 Atmos. Statics & Thermo.	2	Ocn. 401 Intr. to Oceanography	3
Phil. 301 Intr. to Philosophy	3	Spch. 403 Public Speaking	3
Elective	3	Elective	3
	18		19

### SENIOR YEAR

Engl. 301 Writing for Prof. Men	3	Met. 425 Meth. in Climatology	4
Geop. 446 Phys. of Earth	3	Met. 446 Phys. Meteorology	3
Met. 445 Atmos. Phys. Processes	3	Meteorology (elective)	3
Met. 452 Weather Anal. & Prog.	3	Technical Elective	4
Elective (Meteorological or Tech.)	3	Elective	3
Elective	3		17
	18		

For the class graduating in 1965-66

### SENIOR YEAR

Engl. 301 Writing for Prof. Men	3	Met. 425 Meth. in Climatology	4
Met. 445 Atmos. Phys. Processes	3	Met. 446 Phys. Meteorology	3
Met. 452 Weather Anal. & Prog.	3	Meteorology (elective)	3
Spch. 403 Public Speaking	3	Technical Elective	4
Elective (Meteorological or Tech.)	3	Elective	3
Elective	3		17
	18		

NOTES: 1. Electives shall be chosen and approved according to the following policy: Not more than 12 elective hours of advanced courses in meteorology will be permitted toward requirements for graduation.

2. Technical electives are to be chosen from the following courses: Geog. 203; I.En. 458; Math. 405, 414, 417; N.E. 401; Phys. 302, 314, 317, 405, 420.

3. Electives in Meteorology are to be chosen from the following courses: Met. 435, 453, 467, 475, 479, 481, 485.

## Curriculum in MICROBIOLOGY

A major in microbiology offers thorough and comprehensive training in the biology of bacteria and certain of the algae, fungi, and protozoa that supplement the study of the microorganisms in their relation to medicine, industry, and agriculture. The curriculum is intended to equip the student with sound training in the principles of microbial life, as either preparation for graduate study or for a career in either industrial or civil service.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 107 Vertebrate Zoology	3	Biol. 108 Invertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	Elective	1
	17	P.E. 102	R
			18

### SOPHOMORE YEAR

Biol. 101 Gen. Bot. of Seed Plants	3	Biol. 206 Intr. Microbiology	3
Chem. 227 Organic Chemistry	4	Chem. 228 Organic Chemistry	4
Engl. 210 Intr. to Logical Discourse	3	Econ. 203 Prin. of Economics	3
Math. 104 Analytic Geometry	3	Engl. 231 or 232 Surv. of Engl. Literature	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 201 College Physics	4	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	18		18

### JUNIOR YEAR

Biology (Microbiol. elective) <sup>1</sup>	4	Biology (Microbiol. elective) <sup>1</sup>	4
Chem. 316 Quantitative Analysis	2	Chem. 317 Quantitative Analysis	2
Chem. 319 Quant. Anal. Lab.	2	Chem. 320 Instrum. Anal. Lab.	2
Govt. 206 Amer. National Govt.	3	Mod. Lang. Fr., Germ., or Russ.	3
Mod. Lang. Fr., Germ., or Russ.	3	Elective	6
Elective	3		17
	17		

### SENIOR YEAR

B.N. 410 Intr. Biochemistry	4	Biol. 482 Seminar	1
Biol. 481 Seminar	1	Biology (Microbiol. elective) <sup>1</sup>	4
Biology (Microbiol. elective) <sup>1</sup>	4	Gen. 301 Genetics	4
Mod. Lang. Fr., Germ., or Russ.	3	Mod. Lang. Fr., Germ., or Russ.	3
Elective	4	Spch. 403 Public Speaking	3
	16	Elective	3
			18

NOTES: 1. Microbiology electives may be satisfied by B.N. 430; Biol. 327, 353, 438, 457, 608, 630, 647; Chem. 342; D.S. 320, 326; Stat. 406. Selections should be made with the aid of the student's advisor.

2. A program combining the basic requirements for a Bachelor of Science degree in Microbiology with the premedical requirements is available from the Chairman of the University Premedical Committee in the Department of Biology (See page 119).

## OCEANOGRAPHY

Oceanography is the study of the oceans and their boundaries. It is based upon the unity of the sciences of the sea. Effective study of the subject requires thorough previous training in one of the pertinent basic sciences such as biology, chemistry, geology, mathematics, meteorology, and physics, or in engineering. Therefore, much of the work in oceanography is conducted at the graduate level, and the undergraduate program of students who wish to study oceanography must be planned to satisfy certain prerequisite requirements. It is suggested that such students consult regularly during their undergraduate years with the oceanography staff.



Five options, the biological, chemical, geological, physical, and meteorological with their corresponding engineering phases, are offered. The options require different undergraduate programs. These programs are taken in other departments except in the case of meteorological oceanography, where a complete undergraduate program in meteorology is offered in the Oceanography and Meteorology Department.

In the graduate program there are curricula leading to the Master of Science and Doctor of Philosophy degrees in each of the five options in oceanography. Specific prerequisite requirements are set up for each curriculum. In general, these consist of the courses normally required for the degree of Bachelor of Science in one of the basic fields listed above and some course work in each of the other fields.

Oceanography may be utilized in solving certain problems arising in fisheries work, offshore oil and gas operations, navigation, prevention of beach erosion, weather forecasting, recreation, extraction of raw materials from the sea, marine construction, coastal sanitation, military operations, fresh water supply, and many other activities. It requires broad interests, numerous skills, a real liking for the sea, and an adaptability to shipboard life.

### Curriculum in PHYSICS

Physics is a fundamental science that deals with energy and matter and their interactions. Its discoveries and laws are basic to real understanding in nearly all areas of science and technology. Some physicists concern themselves primarily with the investigation of fundamental physical phenomena that have not been previously studied or are not well understood. Others may be more interested in making new applications of known physical principles to the solution of industrial and technical problems.

Almost all physicists are employed in industrial laboratories, government laboratories, non-profit research organizations, or educational institutions. Their activities fall into four main categories: research, development and design, teaching, and management or administration. The demand for physicists at all levels of training, from the bachelor's through the Ph.D.'s degree, far exceeds the supply; and indications are that this situation will continue to exist for many years.

The undergraduate curriculum in physics offers the student not only a thorough coverage of the phenomena of classical, atomic, nuclear, solid state, and space physics, but also the opportunity of developing his mathematical tools to the point where he can deal resourcefully and constructively with these phenomena. It also provides a grounding in related sciences, linguistic techniques, and general education. Elective time permits further broadening of the student's education or a degree of concentration in some related phases of science or engineering.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 115 Survey of Biology	4	Chem. 102 Gen. Chemistry	4
Chem. 101 Gen. Chemistry	4	Engl. 104 Composition & Rhetoric	3
Engl. 103 Composition & Rhetoric	3	Math. 122 <sup>1</sup> Calculus	4
Math. 121 <sup>1</sup> Anal. Geom. & Calculus	4	M.S. or A.S.	1
M.S. or A.S.	1	Phys. 218 Mechanics & Heat	4
P.E. 101	R	P.E. 102	R
	16		16

### SOPHOMORE YEAR

Engl. 203 Intr. to Literature	3	Hist. 106 Hist. of United States	3
Hist. 105 Hist. of United States	3	Math. 308 Differential Equations	3
Math. 307 Calculus	3	M.S. or A.S.	1
M.S. or A.S.	1	Modern Language <sup>2</sup>	3
Modern Language <sup>2</sup>	3	Phys. 220 Modern Physics	4
Phys. 219 Sound, Light, Electricity	4	Elective (Literature or Other Humanity)	3
P.E. 201	R	P.E. 202	R
	17		17

## JUNIOR YEAR

First Semester	Credit	Second Semester	Credit
Math. 405 Vector Analysis	3	Modern Language	3
Modern Language	3	Phys. 326 Physics Lab.	1
Phys. 302 Physical Mechanics	3	Phys. 405 Physical Mechanics	3
Phys. 311 Quantum Physics	3	Phys. 413 Electricity & Magnet.	3
Phys. 325 Physics Lab.	1	Phys. 435 Class. Quant. Wave Mech.	3
Electives <sup>3</sup>	5	Electives <sup>3</sup>	4
	18		17

## SENIOR YEAR

Econ. 203 Prin. of Economics	3	Govt. 206 Amer. National Govt.	3
Engl. 301 Writing for Prof. Men	3	Phys. 408 Thermo. & Stat. Mech.	3
Phys. 412 Intr. to Quant. Mech.	3	Phys. 417 Radiation & Optics	3
Phys. 416 Electromag. Fields	3	Phys. 426 Physics Lab.	1
Phys. 425 Physics Lab.	1	Electives <sup>3</sup>	8
Electives <sup>3</sup>	5		—
	18		18

NOTES: 1. An entering student not thoroughly grounded in the fundamentals of algebra and trigonometry is urged to attend summer school prior to the fall semester and take courses equivalent to Math. 102-103 at Texas A&M University. A student not proficient in algebra and trigonometry who is unable to attend summer school should take Math. 102-103 in the fall semester and Math. 121 in the spring semester. It would then be highly desirable that he take Math. 122 in the subsequent term in order to resume the regular schedule in the fall semester of the sophomore year.

2. See "The Foreign Language Requirement," page 99. German or Russian is normally recommended.

3. Not more than 6 of the elective hours that are to be applied toward degree credit may be in physics.

Electives are usually of more value to the student if they are concentrated in a few areas, in which some degree of proficiency or insight at a fairly advanced level may be achieved. Therefore, with his electives, the student would include sequences in which advanced courses have more elementary courses as prerequisites.

The student should choose some of his electives from the liberal arts in order to improve his cultural background and better fit himself for intelligent citizenship in the modern social order. Since the physicist of today is expected to have some acquaintance with the other sciences and with certain of the technologies, the student, depending upon his own interests and aspirations, may well choose the remainder of his electives from those contiguous fields. Courses such as E.G. 105 and 106, M.E. 309 and 310, E.E. 201, C.E. 201 and 315, and higher level courses in the engineering curricula are acceptable electives.

The extreme need for teachers of physics in the secondary schools leads some graduates in physics into the professionally rewarding field of high school teaching. The student preparing for such a career should elect the requisite courses in education.

### Curriculum in PRE-MEDICINE AND PRE-DENTISTRY

America needs many, many more young physicians, dentists, pharmacists, medical technicians, and other members of the "health team" to maintain and protect its health—in family practice, specialization, research, teaching, public health, the armed forces, industrial health, administration, school health, and in government.

Students planning to enter a school of medicine, dentistry, or some other professional area connected with the "health team" without first taking a college degree should take the following program:

## FRESHMAN YEAR

Biol. 107 Vertebrate Zoology	3	Biol. 108 Invertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	17		17

## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Biol. 217 Comp. Anat. of Vertebrates	3	Biol. 218 Comp. Anat. of Vertebrates	3
Chem. 227 Organic Chemistry	4	Chem. 228 Organic Chemistry	4
Engl. 212 Shakespeare	3	Engl. 231 or 232 Surv. of Engl. Literature	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language	3	Modern Language	3
Phys. 201 College Physics	4	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	18		18

## JUNIOR YEAR

Biology (elective)	3	Biology (elective)	3
Chem. 316 Quantitative Analysis	2	Govt. 207 State & Local Govt.	3
Chem. 319 Quant. Anal. Lab.	2	Modern Language	3
Econ. 203 Prin. of Economics	3	Science (elective) <sup>5</sup>	4
Govt. 206 Amer. National Govt.	3	Spch. 403 Public Speaking	3
Modern Language	3	Elective <sup>4</sup>	3
Psy. 207 Gen. Psychology	3		19
	19		

- NOTES: 1. Most students admitted to medical and dental schools in the United States have three or more years of pre-professional training. A large proportion hold college degrees. It is therefore recommended that students preparing to enter medical or dental schools plan to complete at least the foregoing three-year program.
2. Four years of college work with the receipt of the baccalaureate degree is the preferred preparation for medical and dental schools. Majors may be obtained in zoology (See below) or chemistry (See page 114), and also in physics, microbiology, history, English, and other subjects so long as the requirements for entrance to the professional school are satisfied.
3. A student may qualify for the Bachelor of Science degree from Texas A&M University by completing the three-year premedical-predental curriculum on the Texas A&M Campus and at least one full year of acceptable work at a Class A medical school or dental school.
4. Since courses in literature, language, history, and social sciences are not offered in medical or dental schools, leaders in medical education urge prospective medical and dental students to include much of such work in their pre-professional education. Such electives in line with this recommendation should be junior and senior courses selected in consultation with the chairman of the premedical-predental committee.
5. Science electives may be satisfied by taking Chem. 342, B.N. 410, or Gen. 301.

Curriculum in  
ZOOLOGY

The zoology curriculum is aimed at the training of premedical and predental students majoring in zoology, and of zoology majors who expect to teach in secondary schools or enter research fields in marine biology, aquatic ecology, or other similar areas. Graduates may also enter advanced graduate studies in radiation biology, physiology, parasitology, or marine or freshwater ecology.

## FRESHMAN YEAR

Biol. 107 Vertebrate Zoology	3	Biol. 108 Invertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	17		17

## SOPHOMORE YEAR

Biol. 101 Gen. Bot. of Seed Plants	3	Biol. 218 Comp. Anat. of Vertebrates	3
Biol. 217 Comp. Anat. of Vertebrates	3	Econ. 203 Prin. of Economics	3
Engl. 212 Shakespeare	3	Engl. 231 or 232 Surv. of Engl. Literature	3
M.S. or A.S.	1	M.S. or A.S.	1
Modern Language <sup>1</sup>	3	Modern Language <sup>1</sup>	3
Phys. 201 College Physics	4	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	17		17



## JUNIOR YEAR

First Semester	Credit	Second Semester	Credit
Biol. 351 Fund. of Microbiology	4	Biology (Zoology elective)	3
Biology (Zoology elective)	3	Chem. 228 Organic Chemistry	4
Chem. 227 Organic Chemistry	4	Gen. 301 Genetics	4
Govt. 206 Amer. National Govt.	3	Modern Language <sup>1</sup>	3
Modern Language <sup>1</sup>	3	Elective	3
	<hr/> 17		<hr/> 17

## SENIOR YEAR

Biol. 481 Seminar	1	Biol. 482 Seminar	1
Biology (Zoology elective)	4	Biology (Zoology elective)	4
Spch. 403 Public Speaking	3	Elective	13
Elective	9		<hr/> 18
	<hr/> 17		

NOTES: 1. See "The Foreign Language Requirement," page 99.

2. The elective hours in Zoology must include 4 courses chosen from the following: Biol. 343, 344, 422, 433, 434, 435, and 436.

3. Elective hours and the remaining hours required for the major should be selected in consultation with the Head of the Department.

# *The College of Engineering*

## GENERAL STATEMENT

Engineering has been described as the art of applying the mathematical and natural sciences to the practical solution of the technological problems of civilization. Since the Industrial Revolution, engineers—working both in industry and in private practice—have contributed greatly to raising the standards of living for mankind. In recent years particularly industry, through the support of the engineering profession, has made great strides in technological developments. This accelerating pace of advancement has created the demand for an ever increasing number of capable young people in engineering. At the present time over two-thirds of all technical and a large percentage of the supervisory and administrative positions in industry are manned by engineers.

Since, as noted previously, engineering is a creative art based on science, an engineer may either be a “practicing engineer” or an “engineering scientist”, depending upon his professional activity. It is the engineer’s responsibility to utilize known laws of science and mathematics in ways to make them valuable to mankind. Engineers often work as members of a team to solve a problem or to produce a desired product. Individually or as a group the engineer’s responsibility in the production of an item may include steps as follows: the conception of the idea, the design for production, the selection of materials to be used, the determination of markets, the design or selection of machines for production, and the control of costs to ensure a profit.

The contribution of engineers to technological advances in things that affect our everyday living is greater than is often realized. The comforts and conveniences in our homes, the availability of running water, electricity, gas and sewage disposal systems are things that are just taken for granted. The fine automobiles, the excellent highways, the luxurious airplanes, the long range missiles and the orbiting satellites are a few concrete evidences of the work of the engineer. Sometimes known principles and physical laws lie idle and are unused for many, many years before the engineer utilizes them and builds the equipment to make them useful.

The College of Engineering, through its several curricula, offers broad programs of education in the engineering sciences that are designed to develop the student’s abilities and qualities to enable him to enter into and advance with the profession of engineering, and to lead a useful and happy life. Although these programs include as their main core the fundamentals of engineering science and the basic materials related thereto, they also include subjects from the social and humanistic sciences. It is expected that a student who conscientiously applies himself to and successfully completes one of these broad engineering programs not only will be technically trained but also humanly and socially educated.

For the high school graduate, the minimum requirements for university entrance are listed in the earlier pages of this bulletin. On the other hand, for students who are still in high school and who are in a position to plan their high school program in preparation for engineering, the importance of mathematics and science cannot be overemphasized. The best high school background in mathematics would include four years of high level mathematics, with emphasis upon algebra, geometry, and trigonometry.

Also, a student should take as much natural and physical science as possible in high school. Of the sciences, chemistry and physics are of particular importance in the preparation for the study of engineering.

## CURRICULA

### School of Architecture

- Architecture (Five Year Program)
- Architectural Construction
- Landscape Architecture

**Engineering**

Aerospace Engineering  
 \*Agricultural Engineering  
 Chemical Engineering  
 Civil Engineering  
 Electrical Engineering  
 Geological Engineering  
 Geology  
 Geophysics  
 Industrial Distribution

**Industrial Education**

Industrial Arts Teacher  
 Education Option  
 Vocational Industrial Teacher  
 Education Option  
 Industrial Engineering  
 Industrial Technology  
 Mechanical Engineering  
 Petroleum Engineering  
 Petroleum Engineering  
 (Five Year Program)

**Five-Year Combined Degree Plans**

Students who are interested in two areas of engineering or a business foundation to complement their engineering curriculum may pursue programs which lead to two Bachelor's degrees in five years. The following curricula are examples; students interested in other possible combinations should consult with the Dean of Engineering.

Chemical Engineering—General Business  
 Civil Engineering—General Business  
 Geology—Petroleum Engineering  
 \*\*Industrial Engineering  
 Petroleum Engineering—General Business  
 Petroleum Engineering—Chemical Engineering  
 Petroleum Engineering—Geological Engineering  
 Petroleum Engineering—Mechanical Engineering

Students may also pursue a five-year program combining full professional training with a broad general education to qualify for two degrees, the Bachelor of Science degree in a professional field and the Bachelor of Arts degree in one of the liberal arts curricula (see page 61, "Two Degrees").

**INDUSTRY-UNIVERSITY COOPERATIVE EDUCATION**

Cooperative education is a study-work plan of education in which a student alternates periods of attendance in college or university with periods of employment in industry related to his major. This program has been used successfully for many years by colleges and universities throughout the United States. In 1906, Herman Schneider at the University of Cincinnati initiated the first known cooperative education program. Others who have adopted the plan agreed with his belief that a combination of industrial experience and college study would make education richer and more meaningful.

Although Texas A&M has had a somewhat informal cooperative education program involving a few students for several years, it has been only recently that there has been a marked increase of interest and participation. To match this desire of students to find a means of paying for their education as they go, governmental agencies and private industries have provided increasing numbers of engineering-oriented job opportunities for cooperative education students. The students involved in these programs have reported enthusiastically of their experiences. The interest of both students and industry leads us to believe that there will be an increasing number of students at Texas A&M following this plan of education. The plan is a year-round study-work program, with short vacations between periods, that makes it possible with careful planning for a cooperative education student to complete a regular eight-semester Bachelor of Science degree program in one semester or one summer beyond four years.

Those who wish additional information concerning this program should write the Registrar or the Office of the Dean of Engineering.

\*Administered jointly by the Colleges of Agriculture and Engineering.

\*\*A degree of Bachelor of Science in Industrial Engineering may be awarded on the basis of the student's completing the requirements for the degree of Bachelor of Science in Aerospace, Chemical, Civil, Electrical, Mechanical, or Petroleum Engineering and additional required courses.



## NUCLEAR PROGRAM

The University offers Master of Science and Ph.D. degrees in Nuclear Engineering. An explanation of these plans appears under advanced study.

## ADVANCED STUDY

As the knowledge required for advanced engineering design in industry increases, more and more students are finding it desirable to go beyond the usual four-year course. Much of the design in industry today follows the research mode of procedure, the procedure predominantly used in graduate study. Consequently, there has been a growth in graduate study to satisfy the demands of industry for engineers with greater scientific knowledge and research ability. In the future, industry, colleges and universities, and governmental agencies will carry on more and more research, and, therefore, there will continue to be a great demand for engineers with graduate training through the doctorate. It should be pointed out, however, that graduate study is available only to those with more than average ability.

Students who are interested in pursuing one of these graduate programs should take the regular undergraduate program in Aerospace Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, Industrial Engineering, Mechanical Engineering, Petroleum Engineering, Chemistry, Mathematics, or Physics. The following are recommended as electives for the undergraduate program, with the most important listed first. These courses should be taken only after consultation with the head of the student's major department.

Physics 311 Quantum Physics

Nuclear Engineering 401 Nuclear Engineering

Nuclear Engineering 402 Industrial Applications of Radioisotopes

An AGN-201 Nuclear Training Reactor is available for use in the nuclear technology work. The 5 megawatt research reactor in the Texas A&M Nuclear Science Center is available for student training and research.

## SCHOOL OF ARCHITECTURE

### Curriculum in ARCHITECTURE

Architecture is the creation of physical space within which people live, work, play, and worship. It is a profession which is dedicated to the betterment of the total man-made physical environment. The architect, therefore, must not only be able to analyze the general objectives, the specific needs and requirements of the individual or community, but to direct and coordinate the various building operations from design conception to completion of a project.

The School of Architecture offers a program designed to provide young men with a broad and balanced background of fundamental training for professional careers in architecture. The students are encouraged to develop sensibly and to apply their acquired knowledge and skills to solutions of the social and architectural problems of contemporary society. While they are developing their creative abilities, they are encouraged to acquire full recognition of their professional responsibilities to society.

The curriculum is arranged to integrate the technical aspects of materials, equipment, and construction, as well as the social and cultural aspects of art and history of architecture, with its core program in architectural design. The design courses are further strengthened with other related courses in graphic arts, landscape architecture, working drawings, specifications, and professional practice. Design is taught in a series of stages, beginning with basic design in the first and continued through all years as defined in the courses of instruction. The students are assigned problems to be solved individually or by teams. Individual guidance and criticism are given by the instructor, accompanied with group discussions, lectures, and demonstrations. Student work is reviewed and judged by a jury of teachers, practicing architects, and on some occasions, the specialists in a particular project.

The School of Architecture is a member of the Association of Collegiate Schools of Architecture and is on the approved list of schools accepted by the Texas Board of Architectural Examiners. Its curriculum in architecture is five years in length, lead-

ing to a degree of Bachelor of Architecture. The curriculum is accredited by the National Architectural Accrediting Board. Graduates of this program often continue their education in advanced degrees in architecture or in the field of city and regional planning.

## FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Arch. 101 Design I	2	Arch. 102 Design I	2
Arch. 115 Arch. Graphics	2	Arch. 116 Arch. Graphics	2
Engl. 103 Composition & Rhetoric	3	Educ. 106 Surv. of Man's Knowledge	1
Hist. 105 Hist. of United States	3	Engl. 104 Composition & Rhetoric	3
I.Ed. 108 Carp. & Millwork	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 116 Plane Trig. & Anal. Geom.	4
M.S. or A.S.	1	M.E. 101 Engr. Problems	1
P.E. 101	R	M.S. or A.S.	1
	17	P.E. 102	R
			17

## SOPHOMORE YEAR

Arch. 201 Design II	4	Arch. 202 Design II	4
Arch. 205 Graphic Art	2	Arch. 206 Graphic Art	2
Arch. 227 Structural Principles	3	Arch. 228 Elem. of Mechanics	3
Arch. 253 Tech. of Materials	2	Arch. 254 Tech. of Materials	2
Engl. 210 Intr. to Logical Discourse	3	C.E. 206 Plane Surveying	1
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 201 College Physics	4	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	19		17

## JUNIOR YEAR

Arch. 301 Design III	5	Arch. 302 Design III	5
Arch. 305 Graphic Art	2	Arch. 306 Graphic Art	2
Arch. 325 Surv. of Contemp. Art	1	Arch. 326 Surv. of Contemp. Art	1
Arch. 327 Basic Structures	3	Arch. 328 Steel Structures	3
Arch. 335 Mech. & Elec. Equip. for Bldgs.	3	Arch. 336 Mech. & Elec. Equip. for Bldgs.	3
Arch. 339 Art & Civiliz.	3	Arch. 340 History of Arch.	3
	17		17

## SENIOR YEAR

Arch. 401 Design IV	5	Arch. 402 Design IV	5
Arch. 427 Concrete Structures	3	Arch. 428 Roof Structures	3
Arch. 439 History of Arch.	3	Arch. 440 History of Arch.	3
Engl. 371 Great Books	3	Arch. 454 Specif. & Work. Draw.	3
Elective (Humanities)	3	Elective (Humanities)	3
	17		17

## SUMMER WORK

Arch. 500; Summer Practice, twelve weeks, required.

## FIFTH YEAR

Arch. 501 Design V	5	Arch. 502 Design V	5
Arch. 527 Structural Systems	3	Arch. 528 Structural Systems	3
Arch. 556 City Planning	3	Arch. 554 Prof. Practice	2
Land. 411 Lands. Desi. for Arch. & Engr.	3	Arch. 581 Seminar	1
Elective (Humanities)	3	Govt. 206 Amer. National Govt.	3
	17	Sph. 403 Public Speaking	3
			17

Curriculum in  
ARCHITECTURAL CONSTRUCTION

The construction of buildings is one of the major industries in the country. Proper training in technical studies of construction methods, materials, structural systems, soils, equipment, cost estimating, business and real estate laws, and labor management forms a good background for those going into the building construction field.

The intent of this program is to offer a curriculum of study specifically designed to supply college educated and trained personnel for the rapidly expanding building construction industry. This program is not intended to produce graduates who will be following either Engineering or Architecture as a profession. Its purpose is to educate a student who wishes to enter into one of the many facets of the building industry.

The construction program offered by the School of Architecture is designed to prepare young men for this field. Students take courses along with Architecture, Engineering and Business students and become familiar with these related fields.

The program is four years in length and leads to a degree of Bachelor of Science in Architectural Construction. Graduates with this degree usually enter the building construction industry as draftsmen, estimators, superintendents of construction, and ultimately develop their own firms as building contractors. Graduates also enter into sales of building materials and equipment.

Students who successfully complete the degree program for a Bachelor of Science in Architectural Construction may apply for a Masters degree program in specialized areas in related fields, pending approval by the Dean of the Graduate College and the Chairman of the School of Architecture.

Students in this program become members of a very active student chapter of the Associated General Contractors. Through participation in this organization, the students are kept informed of current developments in this field.

The curriculum which follows is adopted for the first time as a four year program for the school year 1965-66. Students regularly entering their fifth year under the previous curriculum should refer to the University catalogue, Volume 87, for their course requirements. Students regularly entering their second, third, and fourth years, under the previous curriculum, should follow the new curriculum and contact their faculty advisor to revise their degree plans.

FRESHMAN YEAR

First Semester		Credit	Second Semester		Credit
Arch. 115	Arch. Graphics	2	Arch. 116	Arch. Graphics	2
Engl. 103	Composition & Rhetoric	3	Engl. 104	Composition & Rhetoric	3
Hist. 105	Hist. of United States	3	Hist. 106	Hist. of United States	3
I.Ed. 108	Carp. & Millwork	3	I.Ed. 107	Ind. Materials & Mfg. Proc.	3
Math. 102	Algebra	3	Math. 121	Anal. Geom. & Calc.	4
Math. 103	Plane Trigonometry	3	M.E. 101	Engr. Problems	1
M.S. or A.S.		1	M.S. or A.S.		1
P.E. 101		R	P.E. 102		R
		18			17

SOPHOMORE YEAR

Arch. 227	Structural Principles	3	Arch. 228	Elem. of Mechanics	3
Arch. 253	Tech. of Materials	2	Arch. 254	Tech. of Materials	2
B.A. 211	Business Law	3	C.E. 201	Plane Surveying	4
Engl. 210	Intr. to Logical Discourse	3	Engl. 301	Writing for Prof. Men	3
Govt. 206	Amer. National Govt.	3	M.S. or A.S.		1
M.S. or A.S.		1	Phys. 202	College Physics	4
Phys. 201	College Physics	4	P.E. 202		R
P.E. 201		R			17
		19			

JUNIOR YEAR

Arch. 327	Basic Structures	3	Arch. 328	Steel Structures	3
Arch. 335	Mech. & Elec. Equip. for Bldgs.	3	Arch. 336	Mech. & Elec. Equip. for Bldgs.	3
B.A. 409	Surv. of Acctg. Prin.	3	C.E. 315	Strength of Mat. Lab.	1
Econ. 203	Prin. of Economics	3	Geol. 320	Geol. for Civil Engrs.	3
I.En. 401	Surv. of I.En.	3	I.En. 412	Labor & Industry	3
Elective		2	Elective		3
		17			16

SUMMER WORK

Arch. 500; Summer Practice, twelve weeks, required.



## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Arch. 427 Concrete Structures	3	Arch. 428 Roof Structures	3
Arch. 439 Hist. of Architecture	3	Arch. 440 Hist. of Architecture	3
Arch. 454 Spec. & Working Draw.	3	C.E. 408 Municipal Admin.	3
Arch. 554 Prof. Practice	2	C.E. 348 Engr. Economy	2
B.A. 428 Real Est. Titles & Conv.	3	C.E. 478 Constr. Plant & Meth.	3
C.E. 473 Cost Estimating	3	Elective	3
	17		17

## Curriculum in

## LANDSCAPE ARCHITECTURE

Landscape architecture is a profession dealing with the art and science of arranging land and water forms and the spaces and objects thereon for the purpose of securing the greatest benefit in human use and enjoyment. As in architecture, it is a creative profession concerned with proper and pleasing physical environment. The creative ability of the landscape architect is expressed by his arrangement of forms, the spaces which he produces with land areas for various purposes, his setting of buildings and structures in relation to surrounding topography, and by his use of plant materials, such as trees, shrubs, grasses, and flowers in his design. He must possess an artistic sense, an engineering ability, be skilled in design, have a fundamental knowledge of plant science, and be knowledgeable of the basic elements of land, water, vegetation, and the forces of nature.

The curriculum has been arranged to provide courses which will develop the student logically. Its major direction consists of courses in design, the supplementary courses in plant materials, construction, architecture, graphic arts, planning, etc., forming a broad background, together with essential technical training for the professional practice of landscape architecture.

Since the students are physically located with those in architecture, an opportunity is afforded through collaborative problems to establish working relationships which are important to their future professional careers.

The program is four years in length, leading to a degree of Bachelor of Science in Landscape Architecture. Graduates are employed in private practice; by city, state, and regional planning departments; or by city, state, or national park systems. Other opportunities exist in teaching, research, and extension work. Graduates in landscape architecture are prepared for advanced study in city or regional planning.

## FRESHMAN YEAR

Biol. 101 Gen. Bot. of Seed Plants	3	Biol. 102 Taxon. of Flower. Plants	3
Engl. 103 Composition & Rhetoric	3	Chem. 106 Gen. Chemistry	4
Hist. 105 Hist. of United States	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	Math. 103 Plane Trigonometry	3
Elective	3	M.E. 101 Engr. Problems	1
P.E. 101	R	M.S. or A.S.	1
	16	P.E. 102	R
			18

## SOPHOMORE YEAR

Arch. 101 Design I	2	Arch. 102 Design I	2
Arch. 115 Architectural Graphics	2	Arch. 116 Architectural Graphics	2
Arch. 253 Tech. of Materials	2	Arch. 254 Tech. of Materials	2
C.E. 201 Plane Surveying	4	Econ. 203 Prin. of Economics	3
Engl. 210 Intr. to Logical Discourse	3	Flor. 307 Ornamental Plants	3
Flor. 206 Ornamental Plants	3	Land. 201 Hist. of Land. Design	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 201	R	P.E. 202	R
	17		16

## JUNIOR YEAR

First Semester	Credit	Second Semester	Credit
Arch. 205 Graphic Art	2	Arch. 206 Graphic Art	2
Arch. 339 Art & Civiliz.	3	Flor. 425 Land. Maint. & Constr.	4
Engl. 301 Writing for Prof. Men	3	Govt. 206 Amer. National Govt.	3
Land. 304 Landscape Const.	3	Land. 305 Planting Design	2
Land. 320 Land. Design I	4	Land. 321 Land. Design II	4
Elective	2	Elective	2
	17		17

## SUMMER WORK

Land. 300 (Summer Practice, 10 Weeks)

## SENIOR YEAR

Arch. 305 Graphic Art	2	Arch. 306 Graphic Art	2
Arch. 325 Surv. of Contemp. Art.	1	Arch. 326 Surv. of Contemp. Art	1
Flor. 319 Exotic Plants	3	Arch. 554 Prof. Practice	2
Land. 404 Land. Constr.	3	Arch. 556 City Planning	3
Land. 420 Land. Design III	6	Land. 421 Land. Design IV	6
Spch. 403 Public Speaking	2	Elective	3
	17		17

Curricula in  
ENGINEERING

With the exception of geology, industrial distribution, industrial education, and industrial technology, all curricula in engineering are identical in the freshman year. Students who expect to enter engineering curricula and are not thoroughly grounded in the fundamentals of algebra and trigonometry are urged to attend a six-week term of summer school prior to the fall semester of the freshman year and take courses in algebra and trigonometry equivalent to Math. 102 and 103 at the Texas A&M University. Those students who are not proficient in algebra and trigonometry and who are unable to attend summer school should omit Math. 121 and Hist. 105 from their fall semester schedule and take Math. 102 and 103. Math. 121 should be taken in the spring semester and Math. 122 and Hist. 105 in summer school after the freshman year. It is desirable for the student to resume the regular schedule as soon as possible.

## FRESHMAN YEAR

Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
E.G. 105 Engineering Graphics	2	E.G. 106 Descriptive Geom.	2
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Math. 122 Calculus	4
Math. 121 Anal. Geom. & Calculus	4	M.S. or A.S.	1
M.S. or A.S.	1	Phys. 218 Mechanics & Heat	4
P.E. 101	R	P.E. 102	R
	17		18

Curriculum in  
AEROSPACE ENGINEERING

Aerospace engineering is described as the technical activities associated with the development of aerospace vehicles. These include research, analysis, and design in several technical specialties such as aerodynamics, dynamics of aircraft, structures, properties of materials and propulsion.

Aerospace engineering graduates are employed in aerospace industry, government research laboratories, and equipment manufacturing companies in Texas and elsewhere. A considerable number enter the military services as engineering officers. Aerospace engineering graduates are also well qualified for positions in other fields of engineering, since men trained in aerodynamics and the design of high-strength, light-weight structures are in demand in many industries.

The Aerospace Engineering Department has excellent facilities in the Engineering Building on the campus and at the University-owned Easterwood Airport. Facilities

on the campus include a supersonic wind tunnel, an instructional low-speed wind tunnel, a structures laboratory, a materials and process laboratory, and complete shop facilities. The Aeronautical Laboratories, including the large wind tunnel, are located at Easterwood Airport.

The four-year undergraduate curriculum in aerospace engineering leading to the degree of Bachelor of Science includes sound preparation in mathematics, physics, chemistry, English, and mechanics. The junior and senior years are devoted largely to the professional courses in aerodynamics, aerospace structures, aerospace power plants, and aerospace vehicle design. The opportunity to elect courses in a desired specialty is provided in the senior year.

For classes entering in September 1963 and thereafter

### FRESHMAN YEAR

(See page 128)

### SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Aero. 201 Intr. to Aero. Engr.	4	C.E. 305 Mech. of Materials	3
Hist. 106 Hist. of United States	3	Econ. 203 Prin. of Economics	3
Math. 307 Calculus	3	Math. 308 Differential Equations	3
M.E. 212 Engr. Mechanics	3	M.E. 313 Engr. Mechanics	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	18		17

### JUNIOR YEAR

Aero. 301 Theor. Aerodynamics	4	Aero. 303 High Speed Aerodyn.	4
Aero. 304 Elem. Aero. Struct.	3	Aero. 306 Strength of Aero. Mat.	3
Aero. 312 Materials Science	3	Aero. 316 Aero. Propulsion I	3
Aero. 320 Numerical Methods	3	E.E. 307 Electrical Circuits	4
M.E. 323 Thermodynamics	4	M.E. 338 Kinem. & Mach. Des.	3
	17		17

### SENIOR YEAR

Aero. 405 Aero. Structures	3	Aero. 401 Aero. Vehicle Design	4
Aero. 417 Aero. Propulsion II	3	Govt. 206 Amer. National Govt.	3
Aero. 420 Aeroelasticity	3	Technical Elective	6
Aero. 481 Seminar	1	Elective (Humanities or Social Science)	3
S.M. 468 Stat. Indeterm. Struct.	3		—
Technical Elective	3		16
	16		

For the class graduating in 1965-66

### SENIOR YEAR

Aero. 316 Aero. Propulsion I	3	Aero. 401 Aero. Vehicle Design	4
Aero. 405 Aero. Structures	3	Aero. 417 Aero. Propulsion II	3
Aero. 420 Aeroelasticity	3	Technical Elective	6
S.M. 468 Stat. Indeterm. Struct.	3	Elective (Humanities)	3
Technical Elective	3		—
	15		16

NOTES: 1. At least one of the technical electives in the senior year must be selected from Group A.

2. Technical electives for aerospace engineering include the following courses:

Group A: Aero. 312, 419, 421, 423; S.M. 469.

Group B: E.E. 331; Math. 405; M.E. 340; N.E. 401; Phys. 317, 421.

### Curriculum in AGRICULTURAL ENGINEERING

(See page 75 for a discussion of this curriculum.)



## Curriculum in CHEMICAL ENGINEERING

Chemical engineering is that branch of engineering concerned with the development and application of manufacturing processes in which chemical or certain physical changes of materials are involved. These processes may usually be resolved into a coordinated series of unit physical operations and unit chemical processes. The work of the chemical engineer is concerned primarily with the design, construction, and operation of equipment and plants in which series of these unit operations and processes are applied. Chemistry, physics, and mathematics are the underlying sciences of chemical engineering, and economics is its guide in practice.

Chemical engineering became a separate division of engineering with the growth of strictly chemical industries, and it is now recognized as one of the important divisions of engineering, dealing with combustion of fuels, heat treatment of metals and alloys, the preparation of water for potable and industrial use, the refining of petroleum, processing of vegetable oils, the development of electric furnace products, portland cement, lime gypsum, plaster, heavy chemicals, soaps, rubber, corn products, textiles, paper, artificial leather and silks, food products, and other products.

The work of the chemical engineer is the changing of raw materials into finished products with the greatest efficiency and economy. He substitutes a rigid control of processes for guess work and uncertainty and increases the productivity of labor by supplying more efficient processes where the standard and quality of the finished product are revised and the amount of seconds and rejections is reduced. The chemical engineer must also be able to modify a process in order to adapt it to commercial conditions and to select his material for construction with special reference to its use. His work is distinct from that of the chemist on the one hand and the mechanical engineer on the other, though he must have a thorough training in both chemistry and engineering.

The curriculum in chemical engineering is planned to prepare students for the design, construction, and operation of industries in which materials undergo chemical and physical change. The unit operations, such as fluid flow, heat flow, evaporation, drying, distillation, gas absorption, filtration, crushing and grinding, and size separation are basic studies that may be applied to any industry. General chemical processes are also included in the laboratory and classroom work. Research in both of these divisions is fostered by cooperative projects with the Texas Engineering Experiment Station and industrial organizations of the State.

As chemical engineering treats of the processes whereby materials undergo a chemical and physical change, it is apparent that a large number of diversified industries have use for the chemical engineer, not only in the operation and control of processes but in the design of special equipment. Many chemical engineers enter the research laboratory, investigating processes in the laboratory and supervising their operation in the plants, considering carefully the controlling interest of cost as a factor in all industrial operations.

### FRESHMAN YEAR

(See page 128)

### SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Chem. 227 Organic Chemistry	4	Ch.E. 204 Elem. Chem. Engr.	3
Hist. 106 Hist. of United States	3	Chem. 228 Organic Chemistry	4
Math. 307 Calculus	3	C.E. 305 Mech. of Materials	3
M.E. 212 Engineering Mechanics	3	Math. 308 Differential Equations	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	18		18

### JUNIOR YEAR

Ch.E. 304 Unit Operations	3	Ch.E. 314 Unit Operations Lab.	1
Chem. 316 Quant. Analysis	2	Ch.E. 423 Unit Operations	3
Chem. 319 Quant. Anal. Lab.	2	Chem. 324 Physical Chemistry	3
Chem. 323 Physical Chemistry	3	Chem. 326 Phys. Chem. Lab.	1
Chem. 325 Phys. Chem. Lab.	1	Engl. 210 Intr. to Logical Discourse	3
Econ. 203 Prin. of Economics	3	Math. 417 Numerical Analysis	4
Elective (Humanities or Social Science)	3	M.E. 327 Thermodynamics	3
	17		18

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Ch.E. 409 Oil & Gas Tech.	3	Ch.E. 426 Plant Design	4
Ch.E. 424 Unit Operations	3	Ch.E. 428 Ind. Chem. Processes	3
Ch.E. 429 Oil & Gas Tech. Lab.	1	Ch.E. 464 Ch.E. Kinetics	3
Ch.E. 433 Unit Oper. Lab.	1	E.E. 305 Elec. Circ. & Mach.	4
Ch.E. 454 Ch.E. Thermo.	3	Govt. 206 Amer. National Govt.	3
Ch.E. 461 Proc. Cont. & Instrum.	2		
Ch.E. 481 Seminar	1		
M.E. 403 Engineering Lab.	2		17
Elective (Humanities or Social Science)	3		
	19		

Curriculum in  
CIVIL ENGINEERING

The curriculum in civil engineering is organized to provide the graduate with a thorough grounding in the underlying principles of the basic sciences and engineering.

During the first three years all civil engineering students follow a common program. In the fourth year the student is given an opportunity for moderate specialization through a suitable choice of three technical electives. With the assistance of his senior advisor, he may select a program of courses directed toward general civil engineering practice, or toward one of the following specific areas:

Coastal and Ocean Engineering  
Construction Engineering  
Environmental Engineering  
Foundation Engineering and  
Soil Mechanics  
Hydraulic Engineering and  
Fluid Mechanics  
Materials Engineering

Public Works Engineering  
Structural Engineering and  
Structural Mechanics  
Surveying and Photogrammetry  
Transportation Engineering  
Urban Management  
Urban Planning

The field of civil engineering is broad, and very often an individual finds that within a few years after graduation he is specializing in a given area. Although placing major emphasis in one of the programs listed does not restrict the graduate to that field, it does provide him an opportunity to develop a particular interest in greater depth. If graduate work is anticipated, this also affords the possibility of blending undergraduate and graduate programs of study.

For classes entering in September 1964 and thereafter

## FRESHMAN YEAR

(See page 128)

## SOPHOMORE YEAR

C.E. 201 Plane Surveying	4	C.E. 305 Mech. of Materials	3
Hist. 106 Hist. of United States	3	Geol. 320 Geol. for Civil Engrs.	3
Math. 307 Calculus	3	Math. 308 Differential Equations	3
M.E. 212 Engineering Mechanics	3	M.E. 313 Engineering Mechanics	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	18		17

## SUMMER WORK

C.E. 300, Summer Surveying Practice, Credit 5

## JUNIOR YEAR

Aero. 312 Materials Science	3	C.E. 301 Water & Sew. Treatment	3
Aero. 320 Numerical Methods	3	C.E. 307 Highway Engr.	3
C.E. 306 Mech. of Materials	2	C.E. 338 Hydraul. of Drain. Struct.	2
C.E. 311 Hydraulics	3	C.E. 346 Des. of Memb. & Connect.	3
C.E. 336 Hydraulics Lab.	1	C.E. 365 Soil Mech. & Found.	3
C.E. 345 Theory of Struct.	3	Engl. 210 Intr. to Logical Discourse	3
C.E. 348 Engr. Economy	2		
	17		17

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
C.E. 402 Water Sup. & Sew. Prac.	3	C.E. 443 Mat. of Constr.	3
C.E. 444 Reinf. Concrete Struct.	4	C.E. 481 Seminar	1
Govt. 206 Amer. National Govt.	3	E.E. 305 Elec. Circ. & Mach.	4
M.E. 327 Thermodynamics	3	Elective (Social Science)	3
Technical Elective	3	Technical Elective	6
	16		17

For classes graduating in 1965-66 and 1966-67

## JUNIOR YEAR

C.E. 306 Mech. of Materials	2	C.E. 338 Hyd. of Drain. Struct.	2
C.E. 311 Hydraulics	3	C.E. 346 Des. of Memb. & Connect.	3
C.E. 336 Hydraulics Lab.	1	C.E. 365 Soil Mech. & Found.	3
C.E. 345 Theory of Struct.	3	C.E. 444 Reinforced Concrete Struct.	4
Geol. 320 Geol. for Civil Engr.	3	Engr. 210 Intr. to Logical Discourse	3
M.E. 327 Thermodynamics	3	Govt. 206 Amer. National Govt.	3
	15		18

## SENIOR YEAR

C.E. 301 Water & Sew. Treat.	3	C.E. 348 Engr. Economy	2
C.E. 307 Highway Engr.	3	C.E. 402 Water Sup. & Sew. Pract.	3
C.E. 473 Cost Estimating	3	C.E. 443 Mat. of Construction	3
C.E. 483 Anal. & Des. of Structures	3	C.E. 481 Seminar	1
Technical Elective	3	E.E. 305 Electrical Circuit & Mach.	4
	15	Technical Elective	3
			16

NOTES: 1. Technical electives for civil engineering are to be selected from the following courses:

Fall Semester: C.E. 406, 408, 435, 457, 463, 473; Geol. 441; S.M. 468.

Spring Semester: C.E. 403, 417, 456, 458, 470, 478, 483, 486; S.M. 469.

2. Other technical electives may be selected with the recommendation of the senior advisor and the approval of the Head of the Department and the Dean of Engineering.

### Curriculum in ELECTRICAL ENGINEERING

The curriculum in electrical engineering is designed to give the student thorough training in the principles on which electrical phenomena are based. Instruction is provided in the basic sciences and mathematics that serve as the foundation for an engineering career.

The program for the first two years includes mathematics, physics, chemistry, and electrical science together with courses in English, history, economics, and other social and humanistic studies. The third year is devoted largely to the engineering sciences that are appropriate to all fields of electrical engineering. The program in the fourth year consists of studies of a professional nature illustrating the applications of engineering principles to typical problems in the fields of electronics, machinery, and communications. Elective courses in the fourth year permit the student to develop his interest in some particular field of electrical engineering.

Electrical engineering offers many opportunities to young men with suitable training. Graduates presently find employment in the aircraft and missile industry, public utilities, the petroleum industry, communications, and with electrical and electronic manufacturers. Electrical engineering education provides the necessary background for research, design and development, operations, management, and sales in the several industries in which electrical engineers work.

Students who expect to enroll in electrical engineering after attending another college or university should note that there is a six-semester sequence of electrical engineering courses in the curriculum. If the prerequisites are satisfied, transfer students may complete this sequence in two years and one summer session and should plan to transfer at the beginning of the summer session.

A student branch of the Institute of Electrical and Electronic Engineers has been organized on the campus, and membership in this organization serves to keep the student informed about current developments in the field of electrical engineering.



## FRESHMAN YEAR

(See page 128.)

## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
E.E. 201 Elect. & Magnet.	4	Econ. 203 Prin. of Economics	3
Hist. 106 Hist. of United States	3	E.E. 214 Elect. Circ. Theory	4
Math. 307 Calculus	3	Math. 308 Differential Equations	3
M.E. 212 Engineering Mechanics	3	M.E. 313 Engr. Mechanics	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	18		18

NOTE: Transfer students who have completed 68 acceptable credits of college or university work and lack no more than 14 credits of courses required in the sophomore year may attend both summer terms (12 weeks) and arrange a schedule to complete the degree program in four additional semesters. Such students should confer with the departmental advisor before enrolling in the summer session.

## JUNIOR YEAR

C.E. 305 Mech. of Materials	3	E.E. 322 Elect. & Mag. Fields	3
E.E. 323 Elect. Circ. Theory	3	E.E. 324 Elect. Circ. Theory	3
E.E. 325 Electronics	3	E.E. 326 Electronic Circuits	3
E.E. 327 Electrical Lab.	2	E.E. 328 Electrical Lab.	2
Engl. 231 <sup>1</sup> Surv. of Engl. Literature	3	E.E. 330 Elect. Machinery	3
Math. 407 <sup>2</sup> Complex Variables	3	Engl. 232 <sup>1</sup> Surv. of Engl. Literature	3
	17		17

## SENIOR YEAR

E.E. 401 Electrical Machinery	3	E.E. 404 Electrical Lab.	2
E.E. 403 Electrical Lab.	2	E.E. 420 Servo. & Control Devices	3
E.E. 432 Econ. Phases of Engr.	2	Govt. 206 Amer. National Govt.	3
E.E. 439 Electronic Systems	3	M.E. 346 Fluid Mech. & Heat Trans.	3
M.E. 327 Thermodynamics	3	Technical Elective	3
Technical Elective	3	Elective <sup>3</sup>	3
	16		17

- NOTES: 1. Any course in English or American literature may be substituted for Engl. 231 and 232.  
 2. Math. 405, 409, 411, 414, 415, or 417 may be substituted for Math. 409.  
 3. Any junior or senior course from Group I, Humanities and Social Science Electives, page 145, may be chosen.  
 4. Technical electives in electrical engineering are to be selected from the following courses:  
 E.E. 428, 451, 452, 454, 456, 457, 459, 460; Geop. 435; M.E. 340; Phys. 405.

### Curriculum in GEOLOGICAL ENGINEERING

The curriculum in geological engineering provides training in the fundamental principles of engineering as well as specialized training in geology in a normal period of four years. Although this course is designed primarily for the student who expects to be employed as a petroleum geologist, the curriculum is such that the graduate is also qualified for work with railroads, public utilities, construction, ceramics, and other industries in which a knowledge of both geology and engineering is desirable.

Students interested in construction engineering and soil mechanics should consider obtaining a Bachelor of Science degree in Geological Engineering and a Bachelor of Science degree in Civil Engineering. Copies of a degree plan to satisfy requirements for both degrees may be obtained from the Civil Engineering or the Geology Department.

In addition to the above degree programs, five-year combination degree curricula may be arranged, such as geological engineering—business administration, geological engineering—petroleum engineering, or geological engineering—English for a student desiring a broader educational background.

## FRESHMAN YEAR

(See page 128.)

## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Chem. 226 Chemical Calculations	2	Chem. 316 Quantitative Analysis	2
Geol. 201 General Geology	3	Chem. 318 Quant. Anal. Lab.	1
Geol. 203 Crystall. & Mineralogy	4	Geol. 204 Mineral. & Rock Study	2
Geol. 209 Intr. to Field Work	1	Geol. 210 Historical Geology	4
Math. 307 Calculus	3	M.E. 212 Engr. Mechanics	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	18		17

## JUNIOR YEAR

C.E. 305 Mech. of Materials	3	Econ. 203 Prin. of Economics	3
Engl. 231 or 232 Surv. of Engl. Literature	3	Geol. 312 Structural Geol.	3
Geol. 305 Invertebrate Paleont.	4	Geol. 317 Stratig. Paleont.	1
M.E. 313 Engr. Mechanics	3	Govt. 206 Amer. National Govt.	3
Technical Elective <sup>1,6</sup>	3	Hist. 106 Hist. of United States	3
	—	M.E. 327 Thermodynamics	3
	16	Pet.E. 312 Well Logging	1
			17

## SUMMER CAMP

Geol. 300, Field Geology, Credit 6

## SENIOR YEAR

Chem. 323 & 325 Physical Chem. & Lab.		E.E. 305 Elec. Circuits & Mach.	4
Or		Geol. 427 Stratigraphy	3
Math. 417 <sup>4</sup> Numerical Analysis	4	Geol. 482 Seminar	1
Geol. 315 Prin. of Sediment.	3	Geology or Geophysics (elective <sup>3</sup> )	6
Geol. 481 Seminar	1	Elective (Humanities or Social Science)	3
Geology (elective <sup>2</sup> )	3		—
Geop. 435 Prin. of Geophys. Explor.	4		17
M.E. 544 Fluid Mechanics	3		
	18		

NOTES: 1. Technical electives are to be selected from C.E. 465; Math. 308; Pet.E. 305, 307.

2. This geology elective may be satisfied by Geol. 303, 404, 406, or 431.

3. These electives may be satisfied by Geol. 304, 423, 425; Geop. 436, 446.

4. Students desiring training in programming and operating computers should take Math. 308 and 417 and I.E. 458.

Curriculum in  
GEOLOGY

Training in geology is designed to prepare the student in the fundamentals of the earth sciences. These include the study of rocks, minerals, fossils, earth structures, the physical features of the earth's surface, and the economic application of this knowledge.

This curriculum is designed for the student who approaches geology as a science, with the inherent obligation of exploring, observing, analyzing, inquiring, classifying, describing, and finally interpreting the record and the content of the rocks. It is based upon the related sciences of chemistry, physics, mathematics, and biology. It prepares a man either for general geological investigations or for graduate study in geology in a normal period of four years.

## FRESHMAN YEAR

Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
E.G. 105 Engr. Graphics	2	E.G. 106 Descriptive Geom.	2
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Math. 102 Algebra	3	Hist. 105 Hist. of United States	3
Math. 103 Plane Trigonometry	3	Math. 121 Anal. Geom. & Calculus	4
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	16		17

## SOPHOMORE YEAR

First Semester	Credit	Second Semester	Credit
Chem. 226 Chem. Calculations	2	Chem. 316 Quant. Analysis	2
Geol. 201 General Geology	3	Chem. 318 Quant. Anal. Lab.	1
Geol. 203 Crystall. & Mineralogy	4	Geol. 204 Min. & Rock Study	2
Geol. 209 Intr. to Field Work	1	Geol. 210 Historical Geology	4
Math. 122 Calculus	4	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 218 Mechanics & Heat	4	Phys. 219 Sound, Light, Electricity	4
P.E. 201	R	P.E. 202	R
	19		17

## JUNIOR YEAR

Econ. 203 Prin. of Economics	3	C.E. 208 Topog. Surveying	2
Geol. 303 Petrog. & Petrol.	3	Engl. 231 or 232 Surv. of Engl. Literature	3
Geol. 305 Invertebrate Paleont.	4	Geol. 312 Structural Geology	3
Govt. 206 Amer. National Govt.	3	Geol. 317 Stratig. Paleontology	1
Elective in Science or Mathematics <sup>1</sup>	3	Geology (elective) <sup>2</sup>	3
	16	Elective <sup>3</sup>	3
			15

## SUMMER CAMP

Geol. 300, Field Geology, credit 6

## SENIOR YEAR

Geol. 315 Prin. of Sediment.	3	Geol. 427 Stratigraphy	3
Geol. 481 Seminar	1	Geol. 482 Seminar	1
Geology (elective) <sup>2</sup>	3	Geology (elective) <sup>2</sup>	3
Geop. 435 Prin. of Geop. Explor.	4	Geophysics (elective) <sup>4</sup>	3
Elective <sup>3</sup>	6	Elective <sup>3</sup>	6
	17		16

- NOTES: 1. Elective in Science or Mathematics should be chosen from Chem. 323, 325; Math. 307; or Phys. 220 in consultation with, and on approval of, the Head of the Department.
2. Geology electives are to be selected in consultation with, and on approval of, the Head of the Department.
3. Electives are to be chosen from the list of "Humanities-Social Science" on page 145, or from the fields of biology, chemistry, mathematics, or physics, or from junior and senior courses in engineering.
4. Geophysics elective may be either Geop. 436 or 446.

Curriculum in  
GEOPHYSICS

## FRESHMAN YEAR

(See page 128.)

## SOPHOMORE YEAR

Chem. 226 Chem. Calculations	2	Chem. 316 Quantitative Analysis	2
Geol. 201 Gen. Geology	3	Chem. 318 Quant. Anal. Lab.	1
Geol. 203 Crystall. & Mineral.	4	Geol. 204 Min. & Rock Study	2
Geol. 209 Intr. to Field Work	1	Geol. 210 Historical Geology	4
Math. 307 Calculus	3	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	M.S. or A.S.	1
Phys. 219 Sound, Light, Electricity	4	Phys. 220 Modern Physics	4
P.E. 201	R	P.E. 202	R
	18		17

## JUNIOR YEAR

Econ. 203 Prin. of Economics	3	E.E. 331 Theory & Appl. of Elect. Dev.	4
E.E. 307 Elec. Circuits	4	Geol. 312 Structural Geology	3
Engl. 210 Intr. to Logical Discourse	3	Govt. 206 Amer. National Govt.	3
Math. 308 Differential Equations	3	Math. 405 Vector Analysis	3
Technical Elective	3	Phys. 302 Phys. Mechanics	3
	16		16



## SUMMER CAMP

Geol. 300, Field Geology, credit 6

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Chem. 323 Physical Chemistry	3	Geol. 482 Seminar	1
Chem. 325 Phys. Chem. Lab.	1	Geop. 436 Seismic Exploration	3
Geol. 481 Seminar	1	Geop. 446 Physics of the Earth	3
Geop. 435 Prin. of Geop. Explor.	4	Technical Elective	3
Phys. 408 Thermo. & Stat. Mechanics	3	Elective (Humanities or Social Science) <sup>1</sup>	6
Elective (Humanities or Social Science) <sup>1</sup>	3		16
	15		

NOTES: 1. French, German, or Russian is recommended (two semesters of same language).

2. By choice of technical electives, a student may gain proficiency in different fields, such as advanced physics, geology, mathematics, or programming of digital computers. Electives may be selected from the following courses: E.E. 308; Geol. 315, 404, 406, 425, 427; I.En. 458; Math. 409, 410, 414, 417; Phys. 311, 405, 416.

Curriculum in  
INDUSTRIAL DISTRIBUTION

Industrial distribution prepares men for industrial technical sales. This program offers preparation in the methods of producing and distributing industrial products. It also provides an understanding of the personnel and human relations problems associated with the distribution of the products of our vast industrial and manufacturing system.

The program is oriented toward industrial and technical courses because the graduate will be selling industrial tools, equipment, and supplies to industrial centers and contractors. His relationships will be with executives, management, engineers, scientists, and craftsmen.

This is one of the few industrial distribution programs offered in the United States. Graduates of this four-year program receive the Bachelor of Science degree in Industrial Distribution.

## FRESHMAN YEAR

E.G. 105 Engr. Graphics	2	Chem. 106 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	E.G. 106 Descriptive Geom.	2
Hist. 105 Hist. of United States	3	Engl. 104 Composition & Rhetoric	3
I.Ed. 105 Wood Craft	3	Hist. 106 Hist. of United States	3
I.Ed. 107 Ind. Mat. & Mfg. Proc.	3	Math. 116 Plane Trig. & Anal. Geom.	4
Math. 102 Algebra	3	M.E. 202 Mfg. Processes	1
M.E. 201 Mfg. Processes	1	M.S. or A.S.	1
M.S. or A.S.	1	P.E. 102	R
P.E. 101	R		18
	19		

## SOPHOMORE YEAR

Engl. 210 Intr. to Logical Discourse	3	Econ. 203 Prin. of Economics	3
I.Ed. 308 Study of Mod. Indust.	3	E.G. 127 Ind. Freehand Sketch.	2
Math. 223 Diff. & Integ. Calculus	4	H.E. 216 First Aid	1
M.E. 101 Engr. Problems	1	I.Ed. 106 Sheet Metal	3
M.E. 309 Mach. Prod. Tech.	1	I.Ed. 204 Dev. & Prac. in I.Ed.	3
M.S. or A.S.	1	M.E. 310 Mach. Prod. Tech.	1
Phys. 201 College Physics	4	M.S. or A.S.	1
Elective	2	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	19		18

## JUNIOR YEAR

Arch. 331 Mech. & Materials	3	B.A. 211 Business Law	3
B.A. 321 Marketing	3	B.A. 409 Surv. of Acctg. Prin.	3
Govt. 206 Amer. National Govt.	3	Engl. 301 Writing for Prof. Men	3
I.Ed. 328 Ind. Accident Prevention	3	I.Ed. 304 Appl. Ind. Elect.	3
Jour. 321 Industrial Jour.	3	I.Ed. 326 Gen. Metalwork	3
Elective	4	I.En. 302 Production Engr.	2
	19	Elective	1
			18

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
I.Ed. 404 Vis. Aids for Ind. Subj.	2	B.A. 435 Salesmanship	3
I.Ed. 429 Foreman. & Superv.	3	B.A. 446 Mktg. Ind. Products	2
I.Ed. 447 Elect. & Electronics	3	I.Ed. 444 Ind. Distribution	3
Psy. 401 Industrial Psy.	3	I.Ed. 481 Seminar	1
Spch. 403 Public Speaking	2	I.En. 412 Labor & Ind.	3
Elective	4	Elective	6
	17		18

NOTE: Electives for industrial distribution, industrial education, and industrial technology are to be selected from the general engineering electives shown on page 145 or from the following: Chem. 102; C.E. 201, 206, 208, 300; Educ. 426; E.G. 221; Geol. 205; I.Ed. 427; Jour. 315; Math. 104, 121, 209; M.E. 212; P.E. 221; Psy. 207, 305, 323; Soc. 304, 315, 408.

Curriculum in  
INDUSTRIAL EDUCATION

## Industrial Arts Teacher Education Option

This curriculum prepares men to teach Industrial Arts in the junior and senior high schools, technical schools, colleges, and universities.

Industrial arts includes such content areas as general shop, woodwork, metals, drafting, electricity, plastics, ceramics, leather, and other craft courses. The program of industrial arts teacher education provides excellent technical and professional background in the most modern laboratories and classrooms.

Students completing this four-year program receive the Bachelor of Science degree in Industrial Education and are qualified to apply for the appropriate teaching certificate from the Texas Education Agency.

Teacher education students may also qualify for a certificate to teach driver education in junior and senior high schools and in colleges and universities and private agencies by taking six semester hours of specified and approved courses under a program approved by the American Automobile Association and the Texas Education Agency.

## FRESHMAN YEAR

E.G. 105 Engr. Graphics	2	Chem. 106 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	E.G. 106 Descriptive Geom.	2
Hist. 105 Hist. of United States	3	E.G. 128 Math. of Ind. Reprod.	1
I.Ed. 105 Wood Craft	3	Engl. 104 Composition & Rhetoric	3
I.Ed. 107 Ind. Mat. & Mfg. Proc.	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.E. 201 Mfg. Processes	1	M.E. 202 Mfg. Processes	1
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	19		18

## SOPHOMORE YEAR

Econ. 203 Prin. of Economics	3	E.G. 127 Ind. Freehand Sketch.	2
Engl. 203 Intr. to Literature	3	E.G. 221 Bldg. Constr. Draw.	2
I.Ed. 205 Ornamental Iron	3	I.Ed. 106 Sheet Metal	3
M.E. 101 Engr. Problems	1	I.Ed. 109 Cabinet Making	3
M.E. 309 Mach. Prod. Tech.	1	I.Ed. 204 Dev. & Prac. in I.Ed.	3
M.S. or A.S.	1	M.E. 310 Mach. Prod. Tech.	1
Phys. 201 College Physics	4	M.S. or A.S.	1
Elective	1	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	17		19

## JUNIOR YEAR

Engl. 301 Writing for Prof. Men	3	Govt. 207 State & Local Govt.	3
Govt. 206 Amer. National Govt.	3	I.Ed. 304 App. Ind. Electricity	3
I.Ed. 323 Meth. of Tchg. Mech. Draw.	2	I.Ed. 310 Course Making	2
I.Ed. 327 Ind. Arts Handcraft	3	I.Ed. 329 Adv. Cabinet Making	3
I.Ed. 334 Upholstery	2	I.Ed. 332 Plastics & Ceramics	2
Psy. 301 Educational Psychology	3	I.Ed. 336 Des. in the Arts & Crafts	2
Elective	3	Elective	3
	19		18

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
I.Ed. 301 Meth. of Tchg. & Class Mgmt.	3	Educ. 444 Sec. School Curriculum	3
I.Ed. 326 Gen. Metalwork	3	I.Ed. 419 Lab. of Indust. Meth.	3
I.Ed. 404 Vis. Aids for Ind. Subjects	2	I.Ed. 442 Surv. Tchg. in Ind. Arts	6
I.Ed. 406 Ind. Guidance	2	I.Ed. 481 Seminar	1
I.Ed. 447 Electricity & Electronics	3	Elective	5
Spch. 403 Public Speaking	3		
Elective	2		
	18		17

## Vocational Industrial Teacher Education Option

This program is designed for teachers, supervisors, directors, and consultants of vocational educational schools and classes of Texas. Students satisfying the requirements under this program may qualify as teachers under the State Plan for Vocational Education as specified by the Texas Education Agency.

The applicant for this program must have had at least one full year of employed experience at some skilled trade or industrial technical occupation. The student who desires to graduate under this program must submit a written request accompanied by a statement of his employed practical experience. Upon the approval of the request by the Head of the Department and the Dean of Engineering, the student will be permitted to plan a program within the limit of the courses listed here.

Approved industrial experience may be evaluated in terms of academic credits and, if acceptable to the Head of the Department and to the Dean of the College of Engineering, may be used in the place of shop work on the basis of four credit hours for each year of industrial experience up to a maximum of twenty credits. Approved teaching experience may be credited as supervised teaching on the basis of two credit hours per year up to a maximum of six credits.

Graduates of this program will receive the Bachelor of Science degree in Industrial Education and may qualify for the appropriate teaching certificate as approved by the Texas Education Agency.

## REQUIRED COURSES

GENERAL EDUCATION		Minimum Credits
<b>Economics</b>		6
Econ. 203 Prin. of Economics .....	3	
Economics (elective) .....	3	
<b>English</b>		12
Engl. 103 Composition & Rhetoric .....	3	
Engl. 104 Composition & Rhetoric .....	3	
Engl. 203 Intr. to Literature .....	3	
Engl. 210 Intr. to Logical Discourse .....	3	
<b>Government</b>		6
Govt. 206 Amer. National Govt. ....	3	
Govt. 207 State and Local Govt. ....	3	
<b>History</b>		6
Hist. 105 Hist. of United States .....	3	
Hist. 106 Hist. of United States .....	3	
<b>Mathematics</b>		6
Math. 102 Algebra .....	3	
Math. 103 Plane Trigonometry .....	3	
<b>Sociology</b>		3
Sociology (elective) .....	3	
<b>TECHNICAL</b>		
<b>Engineering Drawing</b>		4
E.G. 105 Engr. Graphics .....	2	
E.G. 106 Descriptive Geometry .....	2	
<b>Engineering Problems</b>		1
M.E. 101 Engr. Problems .....	1	
<b>Shop Work</b>		24
Includes credit for industrial work experience		



## SCIENCE

<b>Chemistry</b>		4
Chem. 106 General Chemistry .....	4	
<b>Industrial Supervision or Management</b>		3
I.Ed. 429 Foreman. & Superv. ....	3	
Or		
I.En. 401 Surv. of Industrial Engr. ....	3	
<b>Modern Industries</b>		3
I.Ed. 308 Study of Mod. Ind. ....	3	
<b>Physics</b>		8
Phys. 201 College Physics .....	4	
Phys. 202 College Physics .....	4	

## MILITARY TRAINING

<b>Military or Air Science</b>		4
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## PROFESSIONAL EDUCATION

The courses listed below are the basic ones required by the Vocational Division of the Texas Education Agency for a vocational certificate.

<b>General Requirements</b>		9
I.Ed. 204 Dev. & Prac. in Ind. Educ. ....	3	
I.Ed. 301 Meth. of Tchg. & Class Mgmt. ....	2	
I.Ed. 310 Course Making .....	2	
I.Ed. 424 Org. of Instruct. Mat. ....	2	
Additional courses and related fields are listed below depending upon the certificate desired.		
<b>For Vocational Industrial Shop Teachers</b>		6
Visual Aids for Industrial Subjects		
Methods of Introducing Industrial Organization and Management into Industrial Schools		
Or		6
<b>For Part-Time Cooperative Training Coordinators</b>		6
Follow-up, Visitation, and Coordination in Part-Time Schools		
Related subjects in part-time cooperative programs		
<b>Supervised Teaching</b>		6
<b>Other general education courses suited to the needs of the student</b>		8

## ELECTIVE

<b>To be approved by the Head of the Department</b>		26
<b>TOTAL CREDITS</b>		145

## ELECTIVES

(Same as for Industrial Distribution, see page 137.)

Curriculum in  
INDUSTRIAL ENGINEERING

Industrial engineering is the science of production. Just as the other branches of engineering use the laws of the physical sciences in the design and operation of a product, so does industrial engineering apply these same laws to the design, selection, and operation of the plant in which this product is produced. A major distinction between industrial engineering and other branches is that the industrial engineer must consider not only the behavior of inanimate objects as they are governed by physical laws, but also must include in his plan the behavior of people as they operate together in organizations, whether these organizations be simple or complex.

Although usually the industrial engineer is concerned with the production of a manufactured article, the same principles of scientific analysis, planning, and control which are effective in this field have been found to be quite useful in any activity where a large number of people work together. Thus, industrial engineers find employment in wholesale trade, in transportation, even in banks and insurance companies. Because of the increasing technical complexity of today's manufacturing operations, there is a rapidly increasing demand for the graduate who plans to make his career that of production control and supervision. Many industrial engineers now work in automation and electronic data processing.

## Four-Year Curriculum

The four-year curriculum leading to the Bachelor of Science degree in Industrial Engineering fills the above need by providing training in the basic engineering subjects of mathematics, physics, graphics, chemistry, and mechanics which are common to most engineering curricula. Beyond this, it gives students training in manufacturing processes, setting time standards, production control, quality control, tool engineering, cost analysis, factory design, industrial relations, programming of digital computers, and operations research. This combination well equips the graduate to enter the profession of industrial engineering or production management.

## Five-Year Curriculum

Since there is an insistent and growing demand for men versed in the fundamentals of other branches of engineering and also in the principles of executive control, there are offered five-year curricula designed for students who wish training in industrial and in aerospace, chemical, civil, electrical, mechanical, or petroleum engineering. Thus, in five years the student may complete the requirements for two Bachelor of Science degrees, one in his preferred specialty of engineering and the other in the field of industrial engineering. The completion of the requirements for these two degrees admirably prepares the engineering graduate for rapid advancement.

Students desiring to work toward the two degrees should consult with the Director of Admissions and Registrar or the Head of the Industrial Engineering Department for the course requirements. The industrial engineering courses may be taken either concurrently with courses in any of the above branches, which will enable the students to get both degrees at the same time, or may be taken after the first degree is granted. Ordinarily two semesters of additional work are sufficient to complete the requirements for the second degree in industrial engineering.

### FRESHMAN YEAR

(See page 128.)

### SOPHOMORE YEAR

First Semester		Credit	Second Semester		Credit
Engr. 210	Intr. to Logical Discourse	3	Econ. 203	Prin. of Economics	3
Hist. 106	Hist. of United States	3	Govt. 206	Amer. National Govt.	3
Math. 307	Calculus	3	Mathematics (elective <sup>1</sup> )		3
M.E. 201	Mfg. Processes	1	M.E. 310	Mach. Prod. Tech.	1
M.E. 212	Engr. Mechanics	3	M.E. 313	Engr. Mechanics	3
M.E. 309	Mach. Prod. Tech.	1	M.S. or A.S.		1
M.S. or A.S.		1	Phys. 220	Modern Physics	4
Phys. 219	Sound, Light, Electricity	4	P.E. 202		R
P.E. 201		R			18
		19			

### JUNIOR YEAR

B.A. 409	Surv. of Acctg. Prin.	3	B.A. 430	Cost Acctg. Surv.	3
I.En. 302	Production Engr.	2	C.E. 305	Mech. of Materials	3
I.En. 414	Stat. Control of Qual.	3	C.E. 315	Strength of Mat. Lab.	1
I.En. 458	Prog. of Digital Comp.	4	I.En. 404	Motion & Time Study	3
M.E. 323	Thermodynamics	4	I.En. 420	Intr. to Oper. Res.	3
M.E. 337	Kinematic Drawing	1	M.E. 344	Fluid Mechanics	3
		17			16

### SENIOR YEAR

E.E. 307	Elect. Circuits	4	E.E. 308	Elect. Machinery	3
Engr. 301	Writing for Prof. Men	3	I.En. 412	Labor & Ind.	3
I.En. 415	Prod. Control	2	I.En. 416	Factory Layout	3
I.En. 453	Tool Engr.	3	I.En. 485	Spec. Prob. in Ind. Engr.	2
M.E. 340	Phys. Metallurgy	3	Technical Elective		3
Technical Elective		3	Elective (Humanities or Social Science)		3
		18			17

NOTES: 1. The mathematics elective is to be selected from Math. 308, 414, or 417.

2. The student should observe that the technical electives in industrial engineering may be used for obtaining a better background in statistics, accounting, or economics. Some technical subjects are available for those so inclined. Technical electives are to be selected from the courses listed below: B.A. 211, 304, 337, 341, 363, 420, 459; Econ. 311, 318; E.E. 325, 331\*, 420; E.G. 209; I.Ed. 328; I.En. 401, 485; Jour. 321; Math. 308, 411, 414, 417; M.E. 338\*\*, 436, 445, 446, 457; N.E. 401; Psy. 303, 401, 408; Stat. 406.

\*May be used for E.E. 308 and 1 hour of technical elective

\*\*May be used for M.E. 337 and 2 hours of technical elective.

## Curriculum in INDUSTRIAL TECHNOLOGY

Industrial technology prepares men for industrial positions in industrial relations, safety (industrial accident prevention), supervision, production, and employee training. Careers in safety are generally available with casualty insurance companies as well as with many of the larger industries. Among the positions in safety are inspectors, specialists, coordinators, directors, and industrial accident prevention consultants.

The industrial technologist assists with technical details; uses tools and instruments; fabricates, operates and maintains; tests and performs scientific and technical operations; and reports on and carries out prescribed action. Interests and abilities determine the direction of specialization within this field. The graduate is awarded the Bachelor of Science degree in Industrial Technology.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
E.G. 105 Engr. Graphics	2	Chem. 106 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	E.G. 106 Descriptive Geom.	2
Hist. 105 Hist. of United States	3	Engl. 104 Composition & Rhetoric	3
I.Ed. 105 Wood Craft	3	Hist. 106 Hist. of United States	3
I.Ed. 107 Ind. Mat. & Mfg. Proc.	3	Math. 116 Plane Trig. & Anal. Geom.	4
Math. 102 Algebra	3	M.E. 202 Mfg. Processes	1
M.E. 201 Mfg. Processes	1	M.S. or A.S.	1
M.S. or A.S.	1	P.E. 102	R
P.E. 101	R		18
	19		

### SOPHOMORE YEAR

Engl. 210 Intr. to Logical Discourse	3	Econ. 203 Prin. of Economics	3
I.Ed. 308 Study of Mod. Ind.	3	E.G. 127 Ind. Freehand Sketch.	2
Math. 223 Diff. & Integ. Calculus	4	H.E. 216 First Aid	1
M.E. 101 Engr. Problems	1	I.Ed. 106 Sheet Metal	3
M.E. 309 Mach. Prod. Tech.	1	I.Ed. 204 Dev. & Pract. in Ind. Educ.	3
M.S. or A.S.	1	M.E. 310 Mach. Prod. Tech.	1
Phys. 210 College Physics	4	M.S. or A.S.	1
Elective	2	Phys. 202 College Physics	4
P.E. 201	R	P.E. 202	R
	19		18

### JUNIOR YEAR

Arch. 331 Mechan. & Materials	3	B.A. 211 Business Law	3
Govt. 206 Amer. National Govt.	3	Engl. 301 Writing for Prof. Men	3
I.Ed. 328 Ind. Accident Prevent.	3	I.Ed. 304 Appl. Ind. Electricity	3
Jour. 321 Industrial Jour.	3	I.Ed. 326 Gen. Metalwork	3
Elective	7	I.En. 302 Production Engr.	2
	19	I.En. 401 Survey of Ind. Engr.	3
		Elective	1
			18

### SENIOR YEAR

I.Ed. 404 Vis. Aids for Ind. Subj.	2	B.A. 409 Surv. of Acctg. Prin.	3
I.Ed. 429 Foreman. & Superv.	3	I.Ed. 423 Anal. Procedure	2
I.Ed. 447 Elect. & Electron.	3	I.Ed. 438 Ind. Safety	3
Psy. 401 Industrial Psy.	3	I.Ed. 481 Seminar	1
Spch. 403 Public Speaking	3	I.En. 404 Motion & Time Study	3
Elective	4	I.En. 412 Labor & Industry	3
	18	Elective	2
			17

### ELECTIVES

(Same as for Industrial Distribution, see page 137.)



## Curriculum in MECHANICAL ENGINEERING

The breadth of the field of mechanical engineering is such that extensive specialization in undergraduate work is impossible and undesirable. Industry needs mechanical engineers for such a variety of work that it is deemed wise to make the curriculum broad and fundamental.

Training in habits of accurate analysis and logical thinking, the prerequisites of a good engineer, is emphasized.

Fundamental theory courses are supplemented by laboratory work in production processes, testing, instrumentation, and experimentation. Laboratory courses are designed to instruct in methods rather than to develop extensive skills.

Some specialization is possible in that during the senior year the student may elect courses in such fields as air conditioning, automotive engineering, internal combustion engines, turbines, metallurgy, nuclear engineering, and data processing.

The work of professional mechanical engineers varies from general engineering to highly specialized fields. It logically falls under **design, construction and erection, operation and maintenance, research, administration, and sales.**

**Design engineers** may find their work to be that of original design of machines and associated equipment; design of operating assemblies of machines and equipment commercially available for desired manufacturing, or process jobs; redesign of existing equipment to make possible changes, to improve economy, safety, and appearance.

**Construction and erection engineers** may be responsible for assembling and fabricating entire plants and putting them into operation. They must be able to use engineering drawings, plans and specifications, and to do supplementary design work.

**Operation and maintenance engineers** are in charge of plant performance and upkeep. They must be capable of securing profitable operation and of the supervision of plant personnel.

**Research engineers** are called on for an endless variety of investigations. They must have inquiring minds, initiative, patience, thorough knowledge of the fields in which they work, and the ability to analyze and correlate the results obtained. For the research man, graduate study is recommended.

Many engineers who have the leadership ability, personality, tact, and initiative become **administrators and executives.**

**Sales engineers** are probably as much in demand as any other group.

Among the industries that employ a large number of mechanical engineers are: air conditioning, aircraft, aerospace, automotive, chemical, food, paper, power, petroleum, refrigeration, and general manufacturing.

### FRESHMAN YEAR

(See page 128.)

### SOPHOMORE YEAR

First Semester		Credit	Second Semester		Credit
Engl. 203	Intr. to Literature	3	Econ. 203	Prin. of Economics	3
Hist. 106	Hist. of United States	3	Govt. 206	Amer. National Govt.	3
Math. 307	Calculus	3	M.E. 202	Mfg. Processes	1
M.E. 201	Mfg. Processes	1	M.E. 222	Materials Science	2
M.E. 212	Engr. Mechanics	3	M.E. 310	Mach. Prod. Tech.	1
M.E. 309	Mach. Prod. Tech.	1	M.E. 313	Engr. Mechanics	3
M.S. or A.S.		1	M.S. or A.S.		1
Phys. 219	Sound, Light, Electricity	4	Phys. 220	Modern Physics	4
P.E. 201		R	P.E. 202		R
		19			18

### JUNIOR YEAR

C.E. 305	Mech. of Materials	3	E.E. 331	Theory & Appl. of Elect. Dev.	4
E.E. 307	Electrical Circuits	4	Engl. 210	Intr. to Logical Discourse	3
Math. 308	Differential Equations	3	M.E. 328	Thermodynamics	3
M.E. 327	Thermodynamics	3	M.E. 338	Kinem. & Mach. Des.	3
M.E. 340	Phys. Metallurgy	3	M.E. 344	Fluid Mechanics	3
		16	M.E. 403	Engr. Laboratory	2
					18

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
I.En. 401 Surv. of Ind. Engr.	3	E.E. 308 Elect. Machinery	3
M.E. 404 Engr. Laboratory	2	M.E. 417 Power Engr.	3
M.E. 445 Machine Design	3	M.E. 446 Machine Design	3
M.E. 459 Mech. Vibration	3	M.E. 481 Seminar	1
M.E. 461 Heat Transfer	3	Technical Elective	3
Technical Elective	3	Elective (Humanities or Social Science)	3
	17		16

NOTE: Technical electives in mechanical engineering are to be selected from the following courses: I.En. 458; Math. 417; M.E. 409, 410, 414, 432, 436, 457, 485; N.E. 401.

### Curricula in PETROLEUM ENGINEERING

The curricula in petroleum engineering are intended to prepare students for the petroleum industry and particularly for those branches which have to do with drilling, production, and transportation of petroleum as well as with the natural gas industry.

Two programs in petroleum engineering are available to the students in this department, a regular four-year curriculum in petroleum engineering leading to the degree of Bachelor of Science and a five-year curriculum in petroleum engineering leading to the degree of Bachelor of Petroleum Engineering.

In addition to these specific degree programs, five year combination degree curricula may be arranged, such as petroleum engineering—chemical engineering, petroleum engineering—geological engineering, petroleum engineering—mechanical engineering, or petroleum engineering—English for one desiring a broader educational background. Those desiring the five-year combination degree curricula in petroleum engineering and another field should contact the Head of the Petroleum Engineering Department for assistance in planning the course of study.

#### Four-Year Curriculum

(A minimum of six weeks of approved experience in oil field operations or Pet. E. 300 required for registration in senior Petroleum Engineering courses)

The four-year curriculum in petroleum engineering includes sufficient training in civil, mechanical, and electrical engineering to prepare the graduate for the application of engineering principles to the petroleum industry. Courses in geology give an understanding of the geological structures and conditions favorable for petroleum deposits. To the basic subjects are added courses in petroleum engineering which illustrate the application of engineering principles to the type of problems met in the petroleum industry and which also give some understanding of the technique of the industry. Emphasis is placed on thorough grounding in the fundamentals rather than on application to particular problems.

#### FRESHMAN YEAR

(See page 128.)

#### SOPHOMORE YEAR

Geol. 201 General Geology	3	Chem. 316 Quant. Analysis	2
Geol. 207 Mineral. & Rock Study	4	Chem. 318 Quant. Anal. Lab.	1
Math. 307 Calculus	3	Geol. 210 Historical Geology	4
M.E. 212 Engr. Mechanics	3	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	M.E. 313 Engr. Mechanics	3
Phys. 219 Sound, Light, Electricity	4	M.S. or A.S.	1
P.E. 201	R	Phys. 220 Modern Physics	4
	18	P.E. 202	R
			18

#### JUNIOR YEAR

Chem. 323 Physical Chemistry	3	E.E. 305 Elec. Circ. & Mach.	4
Chem. 325 Phys. Chem. Lab.	1	Math. 308 Differential Equations	3
C.E. 305 Mech. of Materials	3	M.E. 346 Fluid Mech. & Heat Trans.	3
Geol. 312 Structural Geol.	3	Pet.E. 306 Reservoir Rock Prop.	2
M.E. 323 Thermodynamics	4	Pet.E. 308 Rock & Fluid Prop. Lab.	1
Pet.E. 305 Petroleum Develop.	2	Pet.E. 310 Reservoir Fluids	3
Pet.E. 307 Petroleum Dev. Lab.	1	Pet.E. 312 Well Logging	1
	17		17

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Pet.E 405 Drilling & Prod. Des.	3	Govt. 206 Amer. National Govt.	3
Pet.E. 409 Subsurface Engr.	2	Pet.E. 402 Pet. Property Mgmt.	3
Pet.E. 413 Pet. Meas. & Transportation	3	Pet.E. 414 Pet. Prod. Engr.	2
Pet.E. 415 Measurements Lab.	1	Pet.E. 438 Reservoir Engr.	2
Pet.E. 428 Reservoir Engr.	2	Elective (Humanities or Social Science)	7
Elective (Humanities or Social Science)	3		—
Elective	3		17
	17		

## Five-Year Curriculum

(A minimum of six weeks of approved experience in oil field operations or Pet. E. 300 required for registration in senior Petroleum Engineering courses)

The five-year curriculum in petroleum engineering is designed to provide a broader educational background. This curriculum contains all the courses included in the four-year curriculum and courses in psychology, accounting, English, economics, business, geography, and advanced mathematics.

## FRESHMAN YEAR

(See page 128.)

## SOPHOMORE YEAR

Geol. 201 General Geology	3	Chem. 316 Quant. Analysis	2
Geol. 207 Mineral. & Rock Study	4	Chem. 318 Quant. Anal. Lab.	1
Math. 307 Calculus	3	Geol. 210 Historical Geology	4
M.E. 212 Engr. Mechanics	3	Hist. 106 Hist. of United States	3
M.S. or A.S.	1	M.E. 313 Engr. Mechanics	3
Phys. 219 Sound, Light, Electricity	4	M.S. or A.S.	1
P.E. 201	R	Phys. 220 Modern Physics	4
	18	P.E. 202	R
			18

## JUNIOR YEAR

Chem. 323 Physical Chemistry	3	Chem. 324 Physical Chem.	3
Chem. 325 Phys. Chem. Lab.	1	Chem. 326 Phys. Chem. Lab.	1
C.E. 305 Mech. of Materials	3	Engl. 210 Intr. to Logical Discourse	3
C.E. 315 Strength of Mat. Lab.	1	Geol. 312 Structural Geol.	3
Engl. 203 Intr. to Literature	3	Math. 417 Numerical Anal.	4
Math. 308 Differential Equations	3	M.E. 346 Fluid Mech. & Heat Trans.	3
M.E. 323 Thermodynamics	4	Spch. 403 Public Speaking	3
	18		20

## SENIOR YEAR

B.A. 211 Business Law	3	BA. 409 Surv. of Acctg. Prin.	3
Econ. 203 Prin. of Economics	3	E.E. 308 Elect. Machinery	3
E.E. 307 Elect. Circuits	4	Pet.E. 306 Reservoir Rock Prop.	2
Engl. 301 Writing for Prof. Men	3	Pet.E. 308 Rock & Fluid Prop. Lab.	1
Engl. 320 Selected Rdg.	1	Pet.E. 310 Reservoir Fluids	3
Pet.E. 305 Petroleum Develop.	2	Pet.E. 312 Well Logging	1
Pet.E. 307 Petroleum Dev. Lab.	1	Elective (Humanities or Social Science)	4
	17		17

## FIFTH YEAR

Geog. 401 International Polit. Geog.	3	Govt. 206 Amer. National Govt.	3
Pet.E 405 Drilling & Prod. Des.	3	Pet.E. 402 Pet. Property Mgmt.	3
Pet.E. 409 Subsurface Engr.	2	Pet.E. 414 Pet. Prod. Engr.	2
Pet.E. 413 Pet. Meas. & Transportation	3	Pet.E. 438 Reservoir Engr.	2
Pet.E. 415 Measurements Lab.	1	Psy. 303 Psy. for Tech. Students	3
Pet.E. 428 Reservoir Engr.	2	Technical Elective*	1
Elective (Humanities or Social Science)	3	Elective (Humanities or Social Science)	3
	17		17



For class graduating in 1965-66

## FIFTH YEAR

First Semester	Credit	Second Semester	Credit
Geog. 401 International Polit. Geog.	3	Govt. 206 Amer. National Govt.	3
Pet.E. 405 Drilling & Prod. Des.	3	Pet.E. 402 Pet. Property Mgmt.	3
Pet.E. 409 Subsurface Engr.	2	Pet.E. 414 Pet. Prod. Engr.	2
Pet.E. 413 Pet. Meas. & Transp.	3	Pet.E. 438 Reservoir Engr.	2
Pet.E. 415 Measurements Lab.	1	Psy. 303 Psy. for Tech. Students	3
Pet.E. 428 Reservoir Engr.	2	Technical Elective*	1
Elective (Humanities or Social Science)	3	Elective (Humanities or Social Science)	3
	<hr/> 17		<hr/> 17

Electives in  
ENGINEERING

Students with the proper prerequisites may choose their general electives from the list below. Other courses are available to the student upon recommendation of department heads and the approval of the Dean of Engineering. With the approval of the department head and the Dean of Engineering, certain courses in the social sciences and in the physical sciences may be used for technical electives.

## I. Humanities

1. Arch. 339, 340, 439, 440; Engl. 212, 231, 232, 315, 316, 321, 322, 327, 328, 334, 336, 340, 350, 371, 375.
2. Modern Languages: Any course offered by the Department.
3. Philosophy and Humanities: Any course offered by the Department.

## II. Social Science

1. Geog. 204, 401; Psy. 207, 301, 303, 305, 401, 403; Soc. 205, 206, 314, 315, 320, 411, 412, 418.
2. Economics: Any course offered by the Department.
3. History and Government: Any sophomore, junior, or senior course offered by the Department.

## III. Others

1. C.E. 348, 406, 408, 435, 457, 473; E.E. 331, 457; E.G. 221; Engl. 301, 410; Geol. 201 or 205; H.E. 216; I.E. 328, 429; I.En. 401, 412, 414, 458; Jour. 304, 311, 315, 321, 406; Ocn. 401; P.E. 210, 221.
2. Air Science: Any junior or senior course offered by the Department.
3. Biology: Any course, but not more than 7 hours of freshman courses.
4. Business Administration: Any sophomore, junior, or senior courses offered by the School.
5. Chemistry: Any sophomore, junior, or senior course offered by the Department.
6. Mathematics: Any junior or senior course offered by the Department.
7. Military Science: Any junior or senior course offered by the Department.
8. Nuclear Engineering: Any course offered by the Department.
9. Physics: Any junior or senior course offered by the Department.

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\*To be chosen from Pet.E. 416, 419, or 481.

# *The School of Military Sciences*

The national interest makes it apparent that every able young American must recognize and support an obligation to defend his country. The military program at Texas A&M University presents an opportunity to coordinate military and civilian career plans leading to a regular or reserve commission. President Kennedy stated the case succinctly, "Ask not what your country can do for you. Ask what you can do for country."

## AIR SCIENCE

The Air Force ROTC program is designed to develop qualities of leadership, character, and citizenship, and to prepare selected students to be commissioned officers in the United States Air Force. Air Force (then Air Service) ROTC units were established in 1920 at the Universities of California and Illinois, at the Massachusetts Institute of Technology, and at the Agricultural and Mechanical College of Texas. Today the program is active at approximately 186 colleges and universities.

The institutional phase of Air Force ROTC, called Aerospace Studies, is divided into two parts. The first two years constitute the General Military Course and the second two years constitute the Professional Officer Course. A student may obtain a commission through one of three distinct programs: the four-year program, the two-year program, or the Financial Assistance Program (scholarship). Details on courses offered are set forth in the alphabetical departmental listing.

The General Military Course examines the causes of contemporary world conflict, Department of Defense organization, and the mission, organization, and capabilities of the United States Air Force. Finally, it prepares the cadet as a candidate for the Professional Officer Course. Cadets enrolled in the General Military Course are exempted from Selective Service draft. Enrollment is limited to students who are citizens of the United States, physically qualified for military training in the Corps of Cadets, loyal to the United States, and of good moral character. Cadets in the first year of the General Military Course attend one hour of class a week; those in the second year attend class for two hours each week.

Leadership training is continuous during the student's life as an Air Force ROTC cadet. In addition to rudimentary military training provided to underclass cadets by unit commanders, each cadet, under the supervision of an Air Force officer, receives training designed to develop leadership potential and knowledge of Air Force fundamentals. He attends career briefings conducted by Air Force junior and senior officers and studies the professional aspects of a career in the Air Force. He participates in orientation visits to Air Force bases and is provided opportunity to fly in Air Force aircraft. Indoctrination in military courtesy, respect for authority, and self-discipline is an integral part of the Air Force ROTC program.

Students apply for enrollment in the Professional Officer Course during the sophomore year. After taking the Air Force Officer Qualification Test, those who pass are interviewed by a board of senior officers. Those selected are further screened by a physical examination administered by a USAF hospital. Enrollment in the Professional Officer Course at the beginning of the junior year is limited to students of high moral character who are physically qualified, possess the necessary interest, intelligence and aptitude, have demonstrated leadership potential, and are well qualified academically. Those who are accepted are enrolled in the Air Force Reserve.

The purpose of the Professional Officer Course is to develop in the cadet skills and attitudes that are vital to his career as a professional Air Force officer. Graduation and a degree are prerequisites to a commission in the Air Force.

Cadets attend class three hours a week during each semester of the Professional Officer Course. In the summer between the first and second years of the Professional Officer Course, cadets in the **four-year program** attend a four-week Field Training course at an Air Force base. They receive \$112, plus a round-trip travel allowance of six cents a mile. During an intensive field training phase, cadets observe the Air Force in operation and become familiar with equipment, procedures, and systems.

As a prerequisite for selection for the two-year Professional Officer Course, junior college transfer students and other students who have not taken the General

Military Course must complete a six-week Field Training course at an Air Force base during the summer before entering the course. Pay during the six-week field training period is \$78 a month with a travel allowance of six cents a mile. Candidates for the two-year Professional Officer Course must meet the same high standards required of cadets in the four-year program. A limited quota has been placed on total enrollment in the two-year program. Selection will be made on a best-qualified basis by a central selection board.

If a student is selected for and enrolls in the Professional Officer Course, he must sign a contract with the government in which he agrees to enlist in the Air Force Reserve, complete the course, complete the field training, and upon graduation, accept a commission as an officer in the Air Force, if tendered. The foregoing become an integral part of the degree requirements of the University. He must also agree to serve on active duty for not less than four years after being commissioned, or if applying for flight training as either a pilot or a navigator, to serve on active duty for not less than four years after completion of flight training. Flight training takes approximately one year. Cadets in this course are exempted for Selective Service draft. Cadets in the non-scholarship program receive \$800 retainer pay from the Air Force during their two years in the Professional Officer Course. No charge is made for uniforms which are provided by the U. S. Air Force. The amount of retainer pay, uniforms and pay and allowances received during field training is approximately \$1,050.

In addition to the four-year and the two-year non-scholarship programs, a limited number of students will be selected competitively for the Financial Assistance Program (scholarship). At this time, the Financial Assistance Program is only available to cadets in the four-year Professional Officer Course. Application for this program is made during the last semester of the General Military Course. In addition to pay and travel allowances received for attending the four-week Field Training course, the U. S. Air Force pays the cadets \$50 monthly retainer pay for not more than 20 months, and the cost of tuition, fees, books, and uniforms.

During his senior year, a cadet who has applied for Air Force pilot training after graduation is given up to 36½ hours of flight training in light aircraft and 35 hours of ground school. Flight training is provided at the University by an FAA-approved flying school operator, and upon successful completion, the student is eligible for a private pilot's license.

Upon completion of the Professional Officer Course and graduation from the University, students are commissioned as second lieutenants in the United States Air Force Reserve. Those who are designated Distinguished Graduates are eligible for commissions in the Regular Air Force.

Air Force ROTC is administered by the Department of Air Science, which is an integral part of the University. All instructors are active duty officers assigned to the University by the United States Air Force. Information about the Air Force ROTC program may be obtained by writing directly to the Department of Air Science.

## MILITARY SCIENCE

Military Science offers both the four-year and the Army's new two-year Advanced Course ROTC program. The new two-year ROTC program offers college men who have not taken the two years of Basic ROTC an opportunity to be commissioned as second lieutenants after only two years of on-campus ROTC training. This two-year program is particularly designed for students who have transferred to the university from junior colleges or other colleges or universities and who have not taken the Basic Course of ROTC. A student qualified for this program is required to satisfactorily complete a basic summer camp of six-weeks' duration between his sophomore and junior years. He then follows the same ROTC program as a cadet in the last two years (Advanced Course) of the four-year ROTC program.

If a student is selected for enrollment in the Advanced Course, he must agree to complete the Advanced Course, complete the ROTC Summer Camp, and accept a reserve commission if one is tendered. He must also agree that, after being commissioned and subject to the orders of the Secretary of the Army, he will serve on active duty for not less than two years or on active duty for training for not more than six months.

The objective of the course of instruction is to produce junior officers who, by their education, training, and inherent qualities, are suitable for continued development as officers in the United States Army. The Army ROTC Program is a General Military Science curriculum, and instruction covers military fundamentals common to



all branches of the service. The aim of the program is to provide a basic military education, and, in conjunction with other University disciplines, to develop individual character and attributes essential to an officer.

Senior cadets who have demonstrated outstanding military aptitude and academic proficiency are designated Distinguished Military Students and are graduated as Distinguished Military Graduates. These cadets may apply for and receive a Regular Army commission similar to a commission tendered from one of the service academies.

The Military Science program provides an Army Flight Training Program to senior cadets who may be qualified and are selected. During his senior year a cadet selected for this training is given up to 36½ hours of flight training in light aircraft and 35 hours of ground school. Flight training is provided at the University by an FAA approved flying school operator, and upon successful completion, the student is eligible for a private pilot's license. Following commissioning, those who have successfully completed the Flight Training Program at the University will receive additional Army aviation flight training during their tour of active duty followed by an Army aviation assignment.

Branch assignments for regular and reserve commissions will be made by the Department of the Army. These assignments will be based on the curriculum of the cadet's major field of study, his preference, his demonstration of leadership, and his technical qualifications. Cadets will select three branches in order of preference; and, if physically qualified for a commission in the combat branches, one selection must be a combat arm.

## THE ARMY'S ARMS AND SERVICES

The Army is organized along functional lines. That is to say, it is organized both administratively and tactically in a manner suited to its needs. Because of the need for occupational specialization, the Army categorizes its personnel by broad functional areas known as branches. Certain branches are made up of basic combat specialists which the nature of modern military operations make necessary for the successful conduct of warfare. These basic combat specialties are: Infantry, Armor, and Artillery.

The Engineer and Signal Branches have dual roles—both in a combat and in a technical area.

Other basic branches, of a technical or administrative service nature, include: the Quartermaster Corps, the Ordnance Corps, the Chemical Corps, the Transportation Corps, the Military Police Corps, the Adjutant General Corps, the Army Intelligence and Security Branch, and the Finance Corps.

Special branches made separate based on professional functions of the Army are: the Chaplains, the Judge Advocate General's Corps, and the Army Medical Service, which includes the Medical, the Dental, the Veterinary, the Medical Service Corps, and the Army Medical Specialists' Corps.

# *The College of Veterinary Medicine*

## **ORGANIZATION**

The College of Veterinary Medicine is organized with seven departments. They are Anatomy, Medicine and Surgery, Microbiology, Parasitology, Pathology, Physiology and Pharmacology, and Public Health. Each department is administered by the Head of the Department, who is responsible to the Dean of Veterinary Medicine for all programs assigned or developed in the department, including teaching, research, extension and service.

A Veterinary Hospital and Ambulatory Clinics are operated within the college to provide clinical laboratories for the veterinary training program.

An extensive research program in animal health and disease is carried on by the faculty and staff of the college, and a large portion of the teaching faculty is engaged in research.

A veterinary extension program carries research information to the veterinarians, animal owners, and other people of the state and nation with the least possible delay. The faculty makes research information available to the students in the classroom and laboratories many years before the data can appear in textbook form.

The three-phase program of teaching, research, and extension provides the organization necessary to cope with the dynamics of veterinary medicine in all its implications.

## **CURRICULA**

### **Pre-Veterinary Medicine (pre-professional)**

The curriculum in pre-veterinary medicine is designed to provide the student who plans to pursue the professional course of study with a broad and liberal academic training at the pre-professional level and, at the same time, prepare the student for the rigorous demands of the technical content of the professional curriculum. In order to accomplish such a dual objective in the two-year period allocated to the pre-veterinary curriculum, the curriculum is an intense one. It includes sound and intensive training in the social and political sciences and humanities, since there is little space in the professional curriculum for these subjects. It is strong in the physical and life sciences, since these are the cornerstones on which the professional curriculum is built. It includes comprehensive acquaintance courses in the field of animal science for those students not having had extensive experience with farm and ranch livestock.

One objective is to initiate social development so that the individual may find pleasure in his environment and make constructive contributions to the society in which he lives. The other objective is to provide the basic foundation on which the individual may build a technical career in the arts and sciences of animal health and disease. Both objectives seek to stimulate the development of the whole man.

### **Veterinary Medicine (professional)**

The professional curriculum seeks to deliver to the veterinary medical profession a student fully equipped to begin a medical career in the arts and sciences of animal health and disease. Emphasis on professional specialization is reserved for the graduate program.

Veterinary medicine encompasses the full scope of the technology of animal health and disease, including the sciences and arts of disease prevention, diagnosis, prognosis, and therapy. The professional curriculum begins at the basic level and systematically moves to the applied.

Graduates are qualified to formulate and implement programs for disease control and prevention in domestic farm animals, poultry, pet animals, zoo animals, fur-bearing animals, experimental laboratory animals, and wild life. They are equipped to administer and advise in the public health problems arising from intertransmission of diseases between man and lower animals. They are prepared for inspection work in milk and meat hygiene and in food processing plants. They are capable of performing animal disease regulatory duties for governmental agencies. They are oriented for professional careers in the armed forces. They are prepared to begin careers in teaching and research in America's colleges and universities.

The degree of Doctor of Veterinary Medicine is awarded to the student upon successful completion of the professional curriculum in veterinary medicine.

The graduate has a wide choice of fields within the veterinary professional framework in which to begin his specialization with full confidence that he has received the training necessary for success.

### Graduate Program (specialization)

Graduate programs leading to the Master of Science and Doctor of Philosophy degrees are available in the departments of the College of Veterinary Medicine. These programs are designed to give effective training in the areas of professional specialization. The programs are research oriented but sufficiently flexible to permit intensive training in many areas of special interest.

### PRE-PROFESSIONAL SCHOLASTIC REQUIREMENTS

The minimum scholastic requirement for enrollment in the professional veterinary curriculum is the satisfactory completion of not less than 68 semester hours of acceptable college or university credit to include the following courses:

- Biology—6 hours (to include botany and zoology)
- Chemistry—16 hours (including at least 5 hours of organic chemistry)
- English—10 hours
- \*Government—6 hours (American and Texas)
- \*History—6 hours (American)
- Mathematics—6 hours (college algebra and trigonometry or higher)
- Physics—8 hours
- Electives—10 hours

Elective hours should be taken in the following areas, depending upon the needs of the individual student, and must have the approval of the student's academic dean: agronomy, animal sciences, biology, economics, English, foreign language, mathematics, psychology, ROTC, sociology, and statistics.

### Curriculum in PRE-VETERINARY MEDICINE

The pre-veterinary curriculum at Texas A&M University is listed below. Students expecting to qualify for enrollment in the professional curriculum in the minimum time of four semesters should pursue essentially the same pattern of courses. Substitution for any course may be made only with the approval of the Dean of Veterinary Medicine.

The curriculum in pre-veterinary medicine is a two-year non-degree curriculum. Students of junior classification or above seeking to complete pre-veterinary medicine requirements at Texas A&M University should confer with the Dean of Veterinary Medicine.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Biol. 101 Gen. Bot. of Seed Plants	3	Biol. 107 Vertebrate Zoology	3
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
Engl. 103 Composition & Rhetoric	3	Engl. 104 Composition & Rhetoric	3
Hist. 105 Hist. of United States	3	Hist. 106 Hist. of United States	3
Math. 102 Algebra	3	Math. 103 Plane Trigonometry	3
M.S. or A.S.	1	M.S. or A.S.	1
P.E. 101	R	P.E. 102	R
	17		17

### SOPHOMORE YEAR

Chem. 227 Organic Chemistry	4	Chem. 228 Organic Chemistry	4
Engl. 203 Intr. to Literature	3	Engl. 210 Intr. to Logical Discourse	3
Govt. 206 Amer. National Govt.	3	Phys. 202 College Physics	4
Phys. 201 College Physics	4	M.S. or A.S.	1
M.S. or A.S.	1	Elective	4
Elective	3	P.E. 202	R
P.E. 201	R		
	18		16

\*State legal requirements in government and history are required for a degree. Any student unable to complete the government requirement in the institution he is attending should consult the Registrar of Texas A&M University about the conditions under which the needed course may be obtained.



## ADMISSION TO THE PROFESSIONAL CURRICULUM

Admission to the professional curriculum in veterinary medicine is granted only for the beginning of the fall trimester. Formal application must be filed with the Director of Admissions and Registrar between March 1 and May 1 of the calendar year in which admission is sought. Accompanying the application form must be 2 complete and official transcripts from each college or university the applicant has attended, including a record of courses in progress.

## ENROLLMENT POLICIES IN THE PROFESSIONAL CURRICULUM

Enrollment in the first year of the professional veterinary medicine curriculum is limited by facilities of the College to a definite number each year. Selection within this quota is based on scholastic record, professional aptitude, and character considerations. Admission to the pre-veterinary curriculum does not carry assurance that the student will be admitted to the professional curriculum.

Because of limited enrollment in the professional curriculum, priority groups for consideration of applications have been established by states of residence as follows:

1. First consideration is given to qualified applicants who are residents of Texas and states with which Texas has contracts through the Southern Regional Education Board up to the limit of the quota.
2. If the quota is not filled from priority group 1, a second group of qualified applicants from states of the United States which have no college of veterinary medicine will be considered.
3. If the quota is not filled from priority groups 1 and 2, a third group of qualified applicants will be considered from other states of the United States which have colleges of veterinary medicine.

An exceptionally well qualified student will be considered without regard to residency.

## BACHELOR OF SCIENCE IN VETERINARY SCIENCE

A student enrolled in the professional veterinary medical curriculum during the Spring Semester of 1964 or thereafter, may qualify for the degree of Bachelor of Science in Veterinary Science upon satisfactory completion of the pre-veterinary requirements and the first four regular trimesters of required courses in the professional curriculum in veterinary medicine, provided the student has not received a bachelor's degree subsequent to initial enrollment in the professional veterinary medical curriculum.

## ADMISSION TO THE THIRD YEAR OF THE PROFESSIONAL VETERINARY CURRICULUM

No student will be permitted to register for the last year of the professional veterinary curriculum until he has completed with an average grade of C or better, all work prescribed in the first six trimesters of the professional curriculum, and has satisfactorily completed a comprehensive examination covering all work taken during the first six trimesters. The comprehensive examination is given after the close of the third trimester of the second year, is interdepartmental in scope, and may be oral, written, or any combination of these. A student must have a passing grade in all courses through the first six trimesters and an average grade of C or better to be eligible to take this examination.

## READMISSION

A student in the professional curriculum who voluntarily withdraws from the University, or who is dropped from the rolls of the University or from the professional veterinary curriculum for cause, forfeits his standing and must apply for readmission and be approved before being re-enrolled. A student who fails any course prescribed in the professional curriculum may be dropped from the curriculum for cause.

## TRIMESTER PROGRAM IN VETERINARY MEDICINE

The trimester system includes three terms of fifteen weeks each during an academic year. The professional veterinary curriculum includes three years, or nine trimesters, of college work.

The first trimester will begin early in September and extend until the beginning of the Christmas recess. The second trimester, beginning early in January, will extend until some date in April. After a spring recess of one week, the third trimester will begin and extend until an early date in August. This plan will permit a summer vacation of four weeks following the close of the third trimester as well as the usual Thanksgiving, Christmas, Easter, and Fourth of July holiday periods.

### Curriculum in VETERINARY MEDICINE

For classes entering the professional curriculum  
in September 1964 and thereafter

#### FIRST YEAR

First Trimester	Credit	Second Trimester	Credit
B.N. 312 Vet. Physiol. Chem.	5	Ento. 208 Vet. Entomology	3
Gen. 301 Genetics	4	V.A. 302 Anatomy	4
V.A. 301 Anatomy	4	V.A. 304 Embryology	4
V.A. 303 Histology	4	V.Mi. 335 Microbiology	5
V.M.S. 311 Hist. of Vet. Profession	1	V.P.P. 326 Physiology	4
	<hr/> 18		<hr/> 20
Third Trimester	Credit		
V.A. 406 Neuroanatomy	2		
V.Mi. 436 Microbiology	5		
V.Par. 483 Parasitology	3		
V.Pat. 443 Gen. Pathology	5		
V.P.P. 427 Physiology	4		
	<hr/> 19		

#### SECOND YEAR

First Trimester	Credit	Second Trimester	Credit
V.M.S. 412 Radiology	2	V.M.S. 570 Gen. Surgery	3
V.Mi. 438 Virol. & Serol.	3	V.M.S. 571 Dis. of Small Animals	5
V.Par. 484 Parasitology	3	V.M.S. 572 Clinical Medicine	1
V.Pat. 444 Special Pathology	5	V.M.S. 573 Obstet. & Reprod. Dis.	4
V.P.P. 429 Endocrinology	3	V.Pat. 548 Nut. & Metab. Dis.	3
V.P.P. 430 Pharmacology	4	V.P.P. 529 Pharmacology	4
	<hr/> 20		<hr/> 20
Third Trimester	Credit		
V.A. 501 Applied Anatomy	3		
V.M.S. 574 Dis. of Large Animals	5		
V.M.S. 575 Operative Surgery	3		
V.M.S. 576 Clinical Medicine	1		
V.P.P. 530 Toxicology	4		
V.P.H. 590 Food Hygiene	3		
	<hr/> 19		

#### THIRD YEAR

First Trimester	Credit	Second Trimester	Credit
V.C. 501 Clinics	9	An.Sc. 320 An. Nut. & Feed.	3
V.M.S. 577 Dis. of Large Animals	3	V.C. 502 Clinics	9
V.M.S. 579 Practice Mgmt.	2	V.M.S. 578 Lab. & Dom. Anim. Health Mgmt.	4
V.Mi. 595 Poultry Diseases	2	V.M.S. 581 Clinical Seminar	1
V.Pat. 549 Clinical Pathol.	2	V.P.H. 594 Prin. of Epidemiology	3
V.P.H. 591 Food Hygiene	2		
	<hr/> 20		<hr/> 20
Third Trimester	Credit		
B.A. 452 Vet. Jurisprudence	3		
Spch. 403 Public Speaking	3		
V.C. 503 Clinics	10		
V.M.S. 582 Clinical Seminar	1		
V.P.H. 595 Public Health	3		
	<hr/> 20		

For the class that entered the professional curriculum in September 1963

### THIRD YEAR

First Trimester		Credit	Second Trimester		Credit
An.Sc. 320	Animal Nut. & Feed.	3	Spch. 403	Public Speaking	3
V.C. 501	Clinics	9	V.C. 502	Clinics	9
V.M.S. 577	Dis. of Large Animals	3	V.M.S. 578	Lab. & Dom. Anim. Health Mgmt.	4
V.Mi. 595	Poultry Diseases	2	V.M.S. 581	Clinical Seminar	1
V.Pat. 549	Clinical Pathol.	2	V.P.H. 594	Prin. of Epidemiology	3
V.P.H. 591	Food Hygiene	2			
		<hr/> 21			<hr/> 20

Third Trimester		Credit
B.A. 452	Vet. Jurisprudence	3
V.C. 503	Clinics	10
V.M.S. 579	Practice Mgmt.	2
V.M.S. 582	Clinical Seminar	1
V.P.H. 595	Public Health	3
		<hr/> 19



# *Texas Maritime Academy*

President, Texas A&M University.....	Earl Rudder, B.S., LL.D.
Superintendent.....	Bennett M. Dodson Master Mariner, Captain U. S. Navy (Retired), B.S.
Academic Assistant.....	Allison W. Saville, Ph.D.

## Board of Visitors

A 15-man Board of Visitors has been selected by the Board of Directors of the Texas A&M University System to advise the President of Texas A&M University in matters concerning the Texas Maritime Academy. The members are prominent citizens from widely scattered areas of Texas with a large sprinkling of men distinguished in shipbuilding, steamship operations, port operations, and international commerce.

Rear Admiral Sherman B. Wetmore, USNR (Retired), Chairman.....	Galveston Ship Pilot and Community Leader
Captain Charles H. Glenwright, Vice Chairman.....	Port Arthur Marine Manager
John A. Parker, Secretary.....	Galveston Insurance Executive
Russell Brierly.....	Houston Marine Surveyor
Captain John T. Everett, USMS, Maritime Administration.....	Washington, D. C. Supervisor, State Maritime Academies
William J. Graff.....	College Station Dean of Instruction, Texas A&M University
Captain Thurman M. Gupton, USNR.....	West Columbia Eighth Naval District Representative: District Judge
Captain Ernest Hendrix.....	New Orleans Steamship Company Executive
Captain Robert L. Jones.....	Galveston President, Master Mates and Pilots Local
Emmett O. Kirkham.....	Galveston Shipyards Executive
Judge Peter J. La Valle.....	Texas City County Judge
Sam D. W. Low.....	Houston U. S. Collector of Customs
J. C. Rudd.....	Orange Marine Sales Manager
Captain Neal S. Storter.....	Brownsville Steamship Company Executive
Captain Wesley A. Walls.....	Corpus Christi Marine Surveyor

## THE TEXAS MARITIME ACADEMY

The Texas Maritime Academy was established in 1962 and is an integral part of Texas A&M University. It offers an opportunity for the high school graduate or college freshman to qualify as an officer in the U. S. Merchant Marine; earn a commission as Ensign, United States Naval Reserve, Inactive; earn a Bachelor of Science degree in Marine Engineering or in Marine Transportation.

## COURSES OF STUDY

Two courses of study are offered—Marine Engineering and Marine Transportation. Each course consists of four years of college and professional education. Upon successful completion of the prescribed course of study and three sea training cruises, and upon passing the United States Coast Guard license examination for Third Mate or Third Assistant Engineer, the graduate will receive a Bachelor of Science degree from Texas A&M University in Marine Engineering or in Marine Transportation.

## ACADEMIC PROGRAM

The school year consists of two semesters in fall and spring for four years and three summer training cruises. The cruises are aboard the training ship Texas Clipper, a former passenger-cargo liner of 15,000 tons and 16 knots. Cruises are of about ten weeks duration and include visits to ports in Europe, the Mediterranean, South America, and the Pacific. Each year the cruise is scheduled to different parts of the world. Classes are conducted aboard ship and each student performs duties which supplement theoretical studies ashore.

Classes for the freshman year are conducted at Texas A&M University campus at College Station. The last three years are spent at the Texas Maritime Academy campus at Galveston on the shores of the Gulf of Mexico. Classrooms and dormitories are modern and air-conditioned.

## CAREER OPPORTUNITIES

Career opportunities in this profession for well-educated and experienced young men are unlimited. A Third Officer may earn more than \$8,000 per year. A Chief Engineer or Master may earn \$15,000 and up a year. Past graduates of maritime academies are now in positions of president, vice president, or other key positions in steamship lines, ocean terminals, shipyards, international transportation agencies and are administrators in all branches of the maritime industry.

## ADMISSION

In addition to meeting the general admission requirements for Texas A&M University as outlined on page 42, the applicant must be a United States citizen, physically fit, at least 17 years of age but less than 22 years of age on admission date, and unmarried and remain unmarried while enrolled.

## ADMISSION OF TRANSFER STUDENTS

Transfer students who have satisfactorily completed two semesters of freshman college courses may be accepted for admission in June. If acceptable, the student will be eligible to participate in the summer training cruise. Applicants who have completed one semester of college may be considered for admission in February. (See Admission of Transfer Students on page 44.)

## EXPENSES

Fees and expenses for the eleven-month program average about \$1,225 annually for Texas residents and \$1,640 for nonresidents. Included in these fees and expenses are: tuition, student services, student activities, property deposit, room rent, room deposit, board plus tax, laundry (limited), textbooks and supplies, laboratory fees, uniforms, and medical care. Incidentals are not included.

## TEXAS MARITIME ACADEMY CATALOGUE

The Texas Maritime Academy publishes a catalogue containing complete information. For this catalogue and additional information, write to the Superintendent, Texas Maritime Academy, Texas A&M University, College Station, Texas. Interested students are welcome to visit the Texas Maritime Academy campus, 50th and Avenue U, Galveston, Texas.

### Curriculum in MARINE ENGINEERING

The Marine Engineering program leads to the degree of Bachelor of Science in Marine Engineering and to the U. S. Coast Guard issued license as Third Assistant Engineer, Steam and Motor Vessels, Ocean, Unlimited. Marine Engineering, which

is closely related to mechanical engineering, emphasizes the design, operations, and maintenance of maritime power plants and associated equipment. Thorough preparation in mathematics, the sciences, and basic and applied engineering subjects is fundamental and necessary.

Engineering theory and practice are coordinated by relating classroom study to the student's practical experience aboard ship.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Chem. 101 Gen. Chemistry	4	Chem. 102 Gen. Chemistry	4
E.G. 105 Engr. Graphics	2	Engl. 104 Composition & Rhetoric	3
Engl. 103 Composition & Rhetoric	3	Math. 121 Anal. Geom. & Calculus	4
Mar.E. 102 Orientation	1	M.E. 309 Mach. Prod. Tech.	1
Mar.T. 101 Marine Orient.	1	Naut. 102 Ship Org. & Oper.	2
Math. 102 Algebra	3	N.S. 110 Orient. & Sea Power	1
Math. 103 Plane Trigonometry	3	Phys. 201 College Physics	4
N.S. 109 Orient. & Sea Power	1	P.E. 102	R
P.E. 101	R		19
	18		

### SUMMER SESSION I

(Ten weeks at sea in training ship)

Engl. 485 Problems	1
Mar.E. 200 Basic Operations	4
	5

### SOPHOMORE YEAR

Hist. 105 Hist. of United States	3	Econ. 203 Prin. of Economics	3
Mar.E. 201 Mar. Engr. Mech.	3	Govt. 206 Amer. National Govt.	3
Mar.E. 203 Engr. Lab.	2	Hist. 106 Hist. of United States	3
Math. 122 Calculus	4	Mar.E. 204 Engr. Lab.	2
N.S. 209 Sea Power	3	Math. 307 Calculus	3
Phys. 202 College Physics	4	N.S. 210 Naval Weapons	3
P.E. 201	R	P.E. 202	R
	19		17

### SUMMER SESSION II

(Ten weeks at sea in training ship)

Engl. 485 Problems	1
Mar.E. 300 Intermediate Operations	4
	5

### JUNIOR YEAR

Mar.E. 301 Fluid Mech. & Heat Trans.	3	Mar.E. 302 Engr. Lab.	1
Mar.E. 303 Mar. Thermo.	3	Mar.E. 304 Mar. Thermo.	3
Mar.E. 307 Electrical Circuits	4	Mar.E. 305 Strength of Materials	3
Math. 308 Differential Equations	3	Mar.E. 306 Mar. Refrig. & Air Cond.	3
Naut. 201 Naval Arch. I	3	Mar.E. 308 Elect. Machinery	3
N.S. 311 Navigation	3	Naut. 202 Naval Arch. II	2
	—	N.S. 310 Naval Operations	3
	19		18

### SUMMER SESSION III

(Ten weeks at sea in training ship)

Engl. 485 Problems	1
Mar.E. 400 Advanced Operations	4
	5

### SENIOR YEAR

Mar.E. 331 Theory & Appl. of Elect. Tubes	4	Engl. 301 Writing for Prof. Men	3
Mar.E. 401 Nucl. Propulsion I	3	Mar.E. 402 Diesel Engr.	3
Mar.E. 403 Mar. Steam & Gas Turb.	3	Mar.E. 404 Mar. Reg. Law	3
Mar.E. 405 Steam Generators	3	Mar.E. 406 Engr. Repairs	2
Mar.E. 409 Naval Arch. III	2	Mar.E. 408 Nucl. Propulsion II	3
Psy. 303 Psy. for Tech. Students	3	N.S. 410 Prin. of Leadership	3
	18		17



## Curriculum in MARINE TRANSPORTATION

The department provides a basic program for deck officer candidates. This program will have a major in the field of Marine Transportation. It is designed to combine the humanities and sciences with maritime subjects to achieve a well-rounded college curriculum which will fully equip a young man to meet the present and future needs of the maritime industry afloat and ashore.

Theory and practice are integrated by relating the scholastic efforts of the academic year to those of the sea training periods in the training ship.

The student who successfully completes the courses required by this curriculum, and after passing the required U. S. Coast Guard examination, receives the degree in Bachelor of Science in Marine Transportation and a federal license as Third Mate in the Merchant Marine.

### FRESHMAN YEAR

First Semester	Credit	Second Semester	Credit
Engl. 103 Composition & Rhetoric	3	Chem. 106 Gen. Chemistry	4
Geog. 201 World Reg. Geog.	3	Engl. 104 Composition & Rhetoric	3
Mar.E. 102 Orientation	1	Math. 106 Spherical Trig.	3
Mar.T. 101 Mar. Orientation	1	Naut. 102 Ship Org. & Oper.	2
Math. 102 Algebra	3	N.S. 110 Orient. & Sea Power	1
Math. 103 Plane Trigonometry	3	Phys. 211 Brief Survey of Phys.	4
N.S. 109 Orient. & Sea Power	1	P.E. 102	R
P.E. 101	R		17
	15		

### SUMMER SESSION I

(Ten weeks at sea in training ship)

Engl. 485 Problems	1
Naut. 200 Bas. Commun., Nav., & Seaman.	4
	5

### SOPHOMORE YEAR

Hist. 105 Hist. of United States	3	Econ. 203 Prin. of Economics	3
M.L. 105 Beg. Spanish	3	Govt. 206 Amer. National Govt.	3
Naut. 203 Seamanship I	3	Hist. 106 Hist. of United States	3
Naut. 204 Terrestrial Navigation	3	M.L. 106 Beg. Spanish	3
N.S. 209 Sea Power	3	Naut. 303 Celestial Navigation	3
P.E. 201	R	N.S. 210 Naval Weapons	3
	15	P.E. 202	R
			18

### SUMMER SESSION II

(Ten weeks at sea in training ship)

Engl. 485 Problems	1
Naut. 300 Intern. Commun., Nav. & Seaman.	4
	5

### JUNIOR YEAR

Econ. 321 Inter. Trade & Finance	3	Hist. 318 Inter. Dev. Since 1918	3
Mar.T. 301 Ocean Transp. I	4	Mar.T. 304 Ocean Transport. II	3
M.L. 205 Intern. Spanish	3	M.L. 206 Intermediate Spanish	3
Naut. 201 Naval Arch. I	3	Naut. 302 Seamanship III	2
Naut. 301 Seamanship II	3	Naut. 202 Naval Arch. II	2
N.S. 309 Naval Machinery	3	Naut. 304 Electronic Navigation	3
	19	N.S. 310 Naval Operations	3
			19

### SUMMER SESSION III

(Ten weeks at sea in training ship)

Engl. 485 Problems	1
Naut. 400 Adv. Commun., Nav., & Seaman.	4
	5

## SENIOR YEAR

First Semester	Credit	Second Semester	Credit
Engl. 301 Writing for Prof. Men	3	Mar.T. 402 Ocean Transportation III	4
Geog. 401 Inter. Polit. Geog.	3	Mar.T. 406 Marine Cargo Oper. II	3
Mar.T. 302 Marine Cargo Oper. I	3	Naut. 401 Seamanship IV	3
Met. 302 Weather Rep. & Forecast.	3	Naut. 404 The Navigator	3
Ocn. 403 Tides, Waves, Currents, Ice	3	N.S. 410 Prin. of Leadership	3
Psy. 303 Psy. for Tech. Students	3		
	<hr/> 18		<hr/> 16

# *The Graduate College*

The principal objective of the Graduate College is to offer education beyond the baccalaureate level to those men and women who aspire to become intellectual leaders in various professions and in various fields of teaching and research.

## **ADMISSION**

A formal application is required of all persons seeking admission to the Graduate College. The application forms, which are available at the office of the Director of Admissions, should be filed not later than four weeks prior to the opening of the semester. Admission to the Graduate College cannot be granted until all the credentials enumerated in the application form have been filed.

All communications relating to admission should be addressed to the Director of Admissions. Questions on other matters concerned with graduate work should be addressed to the Dean of Graduate Studies or to the appropriate subject matter department.

## **GRADUATE DEGREES**

Graduate courses of study are offered leading to the following degrees:

Master of Agriculture (M.Agr.)

Master of Architecture (M.Arch.)

Master of Arts (M.A.)

Master of Business Administration (M.B.A.)

Master of Computing Sciences (M.C.S.)

Master of Education (M.Ed.)

Master of Engineering (M.Eng.)

Master of Science (M.S.)

Doctor of Education (D.Ed.) (in Industrial Education only.)

Doctor of Philosophy (Ph.D.)

## **PROFESSIONAL DEGREES IN ENGINEERING**

The professional degrees in engineering are available to graduates of this university. These degrees are offered on the basis of acceptable professional experience, a thesis or its equivalent, and an examination. Details concerning requirements for this degree may be obtained upon application to the office of the Dean of Graduate Studies.

## **GRADUATE COLLEGE BULLETIN**

There is published annually as a bulletin of the University an announcement of the work of the Graduate College, in which will be found full information concerning conditions of admission and requirements for degrees, including residence, thesis, and examinations. A copy of this bulletin is available upon request at the Office of the Director of Admissions.



## COURSES OF INSTRUCTION BY DEPARTMENTS

All courses offered in the University are described on the following pages and are listed by department, arranged alphabetically.

The course numbering scheme is as follows:

101 to 199, courses primarily open to freshmen.

201 to 299, courses primarily open to sophomores.

301 to 399, courses primarily open to juniors.

401 to 599, courses primarily open to seniors.

601 to 699, courses primarily open to graduates.

Figures in parentheses following the number of the courses indicate the clock hours per week devoted to theory and practice respectively. Theory includes recitations and lectures; practice includes work done in the laboratory, shop, drawing room, or field. The unit of credit is the semester hour, which involves one hour of theory, or from two to four hours of practice per week for one semester of eighteen weeks.

Roman numerals to the right of the credit value of each course indicate the semester in which it is regularly offered. The letter "S" denotes summer offerings.

Any course may be withdrawn from the session, offerings in case the number of registration is too small to justify the offering of the course.

### Department of Aerospace Engineering

Professors Cronk (Head), Gilruth, Samson; Associate Professors Lowy, Rodenberger, Thomas; Assistant Professors Lowery, Sweet, Tidwell, Ledbetter.

#### 201. Introduction to Aerospace Engineering. (3-3). Credit 4. I, II

Basic aerodynamic phenomena and simplified theory; elementary aerospace vehicle performance. Prerequisites: Math. 122 or 210 or registration therein; M.E. 212 or registration therein; Phys. 219 or registration therein.

#### 301. Theoretical Aerodynamics. (3-3). Credit 4. I

Fluid statics, kinematics, energy, momentum, similarity, viscosity, boundary layer, drag, circulation, lift, potential flow, thin airfoil theory, high lift devices. Prerequisites: Aero. 201; Math. 308.

#### 303. High Speed Aerodynamics. (3-3). Credit 4. II

Airfoil section characteristics and critical Mach Number. Span loading, fundamentals of compressible flow, pressure coefficients, critical conditions, aerodynamic heating, shock waves, compressibility effects, sweep back, and high speed data. Prerequisites: Aero. 301; M.E. 323.

#### 304. Elementary Aerospace Structures. (3-0). Credit 3. I

Aerospace vehicle load analysis, external and internal loads and reactions for trusses, beams, and space frameworks. Prerequisite: C.E. 305.

#### 306. Strength of Aerospace Materials. (2-3). Credit 3. II

Mechanical properties of materials and their use in design of members subject to tension, compression, shear, and bending. Combined stresses and margins of safety. Prerequisite: Aero. 304.

#### 312. Materials Science. (2-3). Credit 3. I

Study of nature of materials; elasticity, plasticity and flow; strength; radiation and thermal effects; corrosion; welding and brazing; adhesives. Prerequisite: Junior classification.

#### 316. Aerospace Propulsion I. (3-0). Credit 3. I

The use of modern instruments for testing aircraft engines; analysis of performance, design study, theory of operation. Prerequisite: M.E. 323.

#### 320. Numerical Methods. (2-3). Credit 3. I

Digital computers; Fortran; approximations; curve fitting; computer techniques of differentiation, integration, interpolation, and extrapolation; numerical solutions of algebraic and differential equations. Prerequisite: Math. 308 or registration therein.

**401. Aerospace Vehicle Design. (2-6). Credit 4. II**

Aerodynamic design, specification, arrangement, performance analysis, weight and balance, stability. Prerequisite: Senior classification.

**405. Aerospace Structures. (3-0). Credit 3. I**

Analysis of thin sheet metal structures, including shells, beams, and compression members subjected to critical loads. Prerequisite: Aero. 306.

**417. Aerospace Propulsion II. (3-0). Credit 3. II**

Study of the development, fundamentals, theories, construction, design and performance of turbo-jet, ram jet, pulse jet, and rocket power plants for aircraft. Prerequisite: Aero. 316.

**419. Chemical Rocket Propulsion. (3-0). Credit 3. I**

Study of nozzles and heat transfer in rockets, liquid and solid propellant systems, combustion and combustion stability, flight performance including trajectories, multi-staging and exchange rate curves, rocket testing. Prerequisite: Aero. 316.

**420. Aeroelasticity. (3-0). Credit 3. I**

Analysis of fundamental vibration phenomena with application to aerospace vehicle aeroelastic problems. Prerequisites: Math. 308; M.E. 313.

**421. Dynamics of Aerospace Vehicles. (3-0). Credit 3. II**

Linear theory of vibrations of single and multi-degree of freedom systems; self-excited vibrations. Applications of matrix algebra. Elementary theory of flutter; landing, impact, gust response, dynamic stability. Prerequisite: Senior classification.

**423. Space Technology I. (3-0). Credit 3. I**

Rocket fundamentals. Trajectories including aerodynamics, gravity turn and trajectory optimization, orbital mechanics, orbit lifetimes, three-body problem, orbit perturbations. Prerequisites: Registration in Aero. 417; Math. 308.

**431. Spacecraft Technology. (3-0). Credit 3. II**

Environmental conditions; detectors and sensing devices; methods of orienting spacecraft; power sources; telemetry systems; structural considerations; electronic components; integration of spacecraft components; fabrication techniques. Prerequisite: Senior classification.

**481. Seminar. (1-0). Credit 1. I**

Readings, reports, conferences, and discussion. Prerequisite: Senior classification in aerospace engineering.

**485. Problems. Credit 1 to 4. I, II, S**

Special problems in aerospace engineering assigned to individual students or groups. Prerequisites: Senior classification; approval of Department Head.

(See S.M. 468, 469 for descriptions of related courses.)

**FOR GRADUATES****601. Principles of Fluid Motion. (4-0). Credit 4. I**

Mathematical methods of analysis are emphasized. Perfect fluid theory development. Treatment of viscosity and boundary layer phenomena. Prerequisite: Aero. 303.

**603. Aerodynamics of the Airplane. (4-0). Credit 4. II**

Application of vector analysis to two- and three-dimensional airfoil theory. Viscosity and compressibility. Drag of aircraft components. Static and dynamic stability criteria. Prerequisite: Aero. 303.

**604. Dynamics of Compressible Fluids. (4-0). Credit 4. I**

Properties of compressible fluids, dynamics of one-dimensional motion, channel flows, shock waves, methods of observation, extension to two- and three-dimensional flow, effects of viscosity. Prerequisite: Aero. 303 or approval of Department Head.

**606. Space Propulsion. (3-0). Credit 3. II**

Propulsion systems performance, power generation, thermal and electrical power propulsion, fundamentals of magnetohydrodynamics. Prerequisites: Aero. 601; E.E. 322; or approval of instructor.

**608. Aircraft Flutter Analysis. (4-0). Credit 4. II**

Theoretical development of the structural and aerodynamic equations for two- and

three-dimensional flutter. Numerical solutions in practical problems to determine flutter velocities. Methods of testing to determine vibration characteristics of aircraft. Prerequisite: Aero. 420, or M.E. 459 or 617.

**610. Nuclear Rocket Propulsion. (3-0). Credit 3. II**

Basic rocket performance, system analysis, heat transfer and fluid flow, materials, nucleonics, system and component testing. Prerequisites: Aero. 417; N.E. 601.

**612. Space Technology II. (3-0). Credit 3. II**

Satellite launch trajectories, oblate effects and precession, lunar trajectories, interplanetary operations and orbit transfer, satellite recovery and re-entry. Prerequisite: Aero. 423.

**632. Structural Design of Missiles and Spacecraft. (3-0). Credit 3. II**

Flight loads; environment; heat transfer and thermal stresses; materials and material behavior; pressure-stabilized structures; aeroelastic effects and dynamic loads; structural fatigue; reliability. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Investigation of special topics not within the scope of thesis research and not covered by other formal courses. Prerequisite: Graduate classification in aerospace engineering.

**691. Research. Credit 2 to 6 each semester. I, II, S**

Technical research projects approved by Department Head.

(See S.M. 601, 602, 603, 604, 605, 606, 607, 608, 609 for description of related courses.)

## Department of Agricultural Economics and Sociology

Professors Branson, McNeely, Magee, Nelson, Skrabanek, Timm (Head); Associate

Professors Davis, Edmondson, Farris, Fowler, Kincannon, Moore, Sorensen,

Stelly, Tefertiller, Wooten; Assistant Professors Eddleman, Graves,

Kutach, Kuvlesky, Schmedemann, Shafer, Trock, Upham, Welsch,

Ward; Instructor Krienke

### AGRICULTURAL ECONOMICS

**105. Introduction to Agricultural Economics. (3-0). Credit 3. I, II**

Characteristics of our economic system and basic economic concepts. Survey of the farm and ranch firm and its organization and management; structure and operation of the marketing system; functional and institutional aspects of agricultural finance; government farm programs.

**314. Marketing Agricultural Products. (3-0). Credit 3. I, II, S**

General introductory course covering the operations involved in the movement of agricultural commodities from the farmer to the consumer; including a detailed study of the essential marketing functions of buying, selling, transportation, storage, financing, standardization, pricing, and risk bearing.

**321. Farm and Ranch Records and Accounts. (2-2). Credit 3. I**

Study of methods and systems of recording and analyzing farm and ranch operational data. Laboratory work devoted to acquiring skill in summarizing and using records as effective aids in more profitable farming and ranching. Prerequisite: Twelve hours of credit in technical agriculture.

**325. Principles of Farm and Ranch Management. (2-2). Credit 3. I, II, S**

Economic and business principles applied to the organization of farms and ranches for more profitable operation. Laboratory work utilizes data from actual farms and ranches. Prerequisite: Twenty hours of credit in technical agriculture.

**413. Agricultural Cooperatives. (3-0). Credit 3. II**

Historical development and principles of cooperative associations in our economic system. Organizational and operational aspects of cooperatives; legal considerations, financing, management and member relations. Future role of cooperatives. Prerequisite: Ag.Ec. 314.

**416. Economics of Livestock Marketing. (2-0). Credit 2. I**

Economic analysis of the livestock and meat industry; marketing practices of livestock producers; characteristics of major agencies and services; problems associated with the movement of livestock from producer to consumer. Prerequisite: Ag.Ec. 314.



**422. Land Economics. (3-0). Credit 3. I, II, S**

Study of the economic, institutional, and physical factors involved in the utilization and control of natural resources. Prerequisite: Econ. 203.

**427. Cotton Marketing. (3-0). Credit 3. S**

Geography of supply and demand for cotton; competition of other fibers. Cotton trade procedures and price making in local, central, spinner, and future markets; reducing price risks; cost of merchandising cotton; governmental policies and regulations. Prerequisite: Ag.Ec. 314.

**429. Agricultural Policy. (3-0). Credit 3. II**

An analysis of the causes, nature, and effects of government participation in agriculture. Emphasis is upon the interrelationship of American agriculture and the political and economic system, public administration and interest representation. Prerequisite: Econ. 203.

**430. Agricultural Finance. (3-0). Credit 3. II**

Analysis of the capital requirements for farming and ranching and how they are obtained; principles involved in the use of each type of credit necessary to sound financial management; the risk, costs, and legal aspects of credit. Prerequisite: Econ. 203.

**432. Farm and Ranch Appraisal and Organization. (2-2). Credit 3. II**

Detailed problems involved in the appraisal and organization of specific farms and ranches, covering appraisal principles, procedures, design, analysis, and reporting. Prerequisite: Ag.Ec. 422.

**443. Applied Farm Management. (2-2). Credit 3. S**

Special three-week summer course for professional agricultural workers, reviewing basic economic principles used in farm management. Not open for agricultural economics M.S. or Ph.D. majors. Prerequisites: Baccalaureate degree; experience in professional agricultural work.

**447. Agricultural Prices. (3-0). Credit 3. I**

Analysis of the factors influencing the level of agricultural commodity prices. Analysis of price trends and seasonal variation; parity prices; methods of forecasting demand and prices. Futures trading. Prerequisite: Econ. 323.

**452. International Trade and Agriculture. (3-0). Credit 3. I**

World production and demand of agricultural commodities; world trade in farm products with emphasis on causal factors; national and international policies relating to agriculture. Designed for those interested in foreign agricultural service. Prerequisite: Senior classification.

**481. Seminar. (1-0). Credit 1. I**

Role of the social scientist in the agricultural industry; professional opportunities and responsibilities; individual investigations and reports; discussions with prominent leaders in the field. Prerequisite: Senior classification in agricultural economics or approval of Department Head.

**485. Problems. Credit 1 to 3 each semester. I, II, S**

Study of special problems which are not covered by other courses. Content will depend upon problem studied. Prerequisites: Ag.Ec. 105 or Econ. 203; 3 additional hours of agricultural economics; junior classification; approval of Department Head.

**FOR GRADUATES**

**602. Agricultural Market Organization and Structure. (3-0). Credit 3. S**

An analysis of the framework within which farm products are marketed. Implications of horizontal and vertical integration and governmental activities. Influence of producers, the food and fiber industries, and consumers on market structure. Prerequisite: Ag.Ec. 314.

**603. Land Economics. (3-0). Credit 3. II**

Study of selected problems of the allocation and utilization of natural resources with special reference to government organizations, quasi-government bodies, and other interest groups. Prerequisite: Ag.Ec. 422 or approval of Department Head.

**607. Research Methodology. (3-0). Credit 3. I**

Scientific approach, role of theory and assumptions, bias and prejudice, attributes of problems, methods and tools of agricultural economics and sociology research. Student evaluates research studies and develops thesis prospectus or equivalent. Prerequisite: Approval of Department Head.

**611. Production Economics. (3-0). Credit 3. II**

Economic principles for analyzing agricultural production and resource use; problems are treated regarding the technical unit, the firm and society with emphasis on conditions for efficiency. Prerequisite: Approval of Department Head.

**613. Contemporary Thought in Agricultural Economics. (3-0). Credit 3. I**

Study of contemporary contributions to the thought and analysis of aggregate relationships and problems in the agricultural economy. Prerequisite: Approval of Department Head.

**614. Agricultural Policy. (3-0). Credit 3. S**

Analysis of public policies and programs affecting agriculture. Development of policies and programs for agriculture and their bases. Prerequisite: Ag.Ec. 429 or approval of Department Head.

**617. Economics of Consumption. (3-0). Credit 3. I**

Consumer market for agricultural products; effects of family attributes on preferences and buying habits; consumer motivations; advertising; retail price policies; and market research. Prerequisite: Approval of Department Head.

**619. Farm and Ranch Business. (2-2). Credit 3. I**

Interrelationships of factors affecting profits in farming and ranching. Organization and management of actual farm and ranch businesses. Relation of theory and practice in farming and ranching. Prerequisite: Approval of Department Head.

**620. Capital Market in Agriculture. (3-0). Credit 3. II**

Role of capital in economic growth and structure of the capital market for agriculture. Determinants of aggregate capital supply. Prerequisite: Ag.Ec. 430 or approval of Department Head.

**627. Agricultural Market and Price Analysis. (3-0). Credit 3. I**

Application of economic theory and statistical methods to the analysis of agricultural commodity price behavior. Price forecasting. Relationships among farm prices, marketing costs, and retail prices. Prerequisites: Ag.Ec. 447; B.A. 303.

**629. Public Administration in Agriculture. (3-0). Credit 3. S**

Study of basic theories in public administration in agriculture; techniques for accomplishing public goals; legal basis for public agriculture programs; economic, social, political, and organizational considerations in agriculture programs. Prerequisite: Approval of Department Head.

**633. Economics of Underdeveloped Agricultural Areas. (3-0). Credit 3. S**

Function of agriculture in economic growth. Agricultural productivity as influenced by an economy's physical, cultural, and institutional attributes. Economic problems of underdeveloped areas. Prerequisites: Econ. 330; approval of Department Head.

**641. Statistical Methods in Agricultural Economics. (2-2). Credit 3. II**

Planning statistical research project; developing forms; selecting sample; conducting study; tabulating, analyzing and interpreting the data. Prerequisites: B.A. 303 or Stat. 406 or equivalent; 15 hours of social science; approval of Department Head.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Review of current literature, preparation of papers on selected topics, discussions with visiting agricultural economists. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Directed individual study of a selected problem in the field of agricultural economics. Prerequisite: Approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Initiation and completion of a research project of approved scope for an advanced degree. Prerequisite: Approval of Department Head.

## SOCIOLOGY

**205. Principles of Sociology. (3-0). Credit 3. I, II, S**

Introductory survey course designed to acquaint the student with elementary principles of sociology.

**206. Social Institutions and Processes. (3-0). Credit 3. I, II**

Introduction to major sociological theories, concepts and principles relating to the complexity of modern society. Research studies in social processes, stratification, and institutions which produce social organization and disorganization are emphasized.

**304. Criminology and Juvenile Delinquency. (3-0). Credit 3. I, II**

Historical and contemporary theories of criminology coupled with citation of significant research. Causes, extent, cost, ecology of crime. Police, criminal and juvenile courts, prisons, reformatories, prevention, and rehabilitation. Prerequisite: Junior classification.

**306. Principles of Social Work. (3-0). Credit 3. I, S**

Private and public welfare agencies. Techniques of interviewing, group work, case work, and social work organization. Professional employment in social work. Prerequisite: Soc. 205 or 9 hours of social science.

**310. Cultural Anthropology. (3-0). Credit 3. I**

Evolution of cultures. Differences, similarities and effects of material and non-material culture on economic, social, and political organization. Contributions of social scientists to cultural anthropology. Prerequisite: Junior classification.

**314. Social Problems. (3-0). Credit 3. I**

Social problems explored from standpoint of social, economic, political, and physical implications operating to produce the impact of social change. Solutions to major social problems. Prerequisite: Soc. 205 or approval of Department Head.

**315. The Family. (3-0). Credit 3. I, II**

The family as a social institution. Family formation, courtship, engagement, marriage, personal adjustment, financing, and child rearing are emphasized. Prerequisite: Junior classification.

**320. Social Anthropology. (3-0). Credit 3. II**

Cultural patterns in relation to social systems, institutions, customs, values, ethos, universal constants, and culture diffusion. Implementing social, cultural, and technological changes. Adjustment of personnel to foreign cultures. Prerequisite: Soc. 205 or approval of Department Head.

**321. Urban Sociology. (3-0). Credit 3. I, II**

Sociological approach to study of urban society. Historic, modern, and comparative perspective with major emphasis on demography, ecology, social and cultural organization, social relationships, social change, and planning. Prerequisite: Junior classification.

**404. Community Development. (3-0). Credit 3. II**

Delineation of communities and problems associated with each particular type. Examination of strategies of change that can be applied to community development. Prerequisite: Soc. 205 or 407.

**407. Human Relations in Agriculture. (3-0). Credit 3. I, II, S**

Interpersonal, group, and institutional relationships in a changing rural environment. Human factors involved in dynamic agricultural situations. For students in technical agriculture. Prerequisite: Junior classification.

**408. Organization for Boy Scout Work. (2-0). Credit 2. II**

The Scouting movement. Understanding youth and providing programs to meet their needs. Developing adult leaders. Prerequisite: Senior classification.

**411. Social Psychology. (3-0). Credit 3. I, II**

Analysis of human behavior. Effect of social experiences and groups on the development of personality. Attitudes, values, and motives. Social adjustment and maladjustment, including analysis of causes. Prerequisite: Three hours of sociology or psychology.



**412. Population Analysis. (3-0). Credit 3. II, S**

Methods of demographic analysis. Influence of demographic phenomena on social values and structure. Theories of growth and change. Prerequisites: Twelve hours of social science; approval of instructor.

**418. Public Opinion and Social Control. (3-0). Credit 3. I**

Nature and function of public opinion, social-psychological processes basic to public opinion. Opinion formation and change. Opinion measurement. Analysis of propaganda, mass media and communications, social organization and social order. Prerequisite: Soc. 205.

**430. Sociological Theory. (3-0). Credit 3. I**

Historical development of sociology as a scientific discipline. Development of general orientations, conceptual schemes, and theories that characterize modern sociology. Prerequisite: Soc. 205.

**481. Seminar. (1-0). Credit 1. I**

Preparation by students of papers on role of social scientist in fields of research, organization, and management within the framework of social systems. Prerequisite: Senior classification in sociology.

**485. Problems. Credit 1 to 3 each semester. I, II, S**

Special problems not covered by other courses. Course depends upon needs and interests of the student, and number of credit hours. Prerequisite: Senior classification in sociology.

**FOR GRADUATES****601. Rural-Urban Relations. (3-0). Credit 3. I, S**

City growth trends and their impact upon fringe areas. Economic, commercial, residential structures and basic urban institutions. Problems and a search for the ideal city. For students in architecture, administration, education, and transportation. Prerequisite: Soc. 205 or 12 hours of social science\*.

**602. Contemporary Theory in Rural Sociology. (3-0). Credit 3. II**

Development of professional field of rural sociology. Theories and contributions of sociologists and social scientists to field of rural sociology. Prerequisite: Soc. 205 or 12 hours of social science\*.

**606. Youth Leadership. (4-0). Credit 4. I**

Problems of youth, training techniques, and programs. Traits, techniques, and attributes of leaders. Prerequisite: Twelve hours of social science\*.

**611. History of Social Thought. (3-0). Credit 3. I**

Social thought from ancient times to present. Evolution of sociological theories and their contributions to modern sociology. Prerequisite: Soc. 205 or 12 hours of social science\*.

**612. The Community. (4-0). Credit 4. II**

Problems, processes, and techniques of community development. Effective methods through community development for improving the general well-being of community residents. Prerequisite: Twelve hours of social science\*.

**618. Educational Sociology. (3-0). Credit 3. II, S**

How the school system can strengthen the democratic way of life. Relationship of education to social organization, social change, and social control. Analysis of role of education in society. Prerequisite: Soc. 205 or a degree in education.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Directed individual study of selected problem in field of sociology. Prerequisite: Approval of instructor.

**691. Research. Credit 1 or more each semester. I, II, S**

Initiation and completion of research project of approved scope for an advanced degree. Prerequisite: Approval of instructor.

\*For this purpose social science is defined to include only courses in agricultural economics, anthropology, economics, political science, psychology, and sociology.

## Department of Agricultural Education

Professors Knebel (Head), Ross; Associate Professors Cook, Holcomb, Holt, Jaska, Webb; Assistant Professor Irick

### 301. Introduction to Agricultural Education. (1-2). Credit 2. I

Introduction to education in agriculture designed to acquaint students with its aims and functions. Prerequisite: Junior classification or approval of Department Head.

### 425. Course Building. (1-2). Credit 2. I

Preparing units of instruction for high school and adult education programs. Prerequisites: Ag.Ed. 301; senior classification; or approval of Department Head.

### 426. Methods in Adult Agricultural Education. (2-0). Credit 2. II

Planning educational programs for adult farm people. Developing skills in use of group processes in teaching. Prerequisite: Senior classification or approval of Department Head.

### 427. Methods of Developing Farming Programs. (1-2). Credit 2. II

Planning and supervising farming and work experience programs of students. Prerequisites: Senior classification or approval of Department Head.

### 436. Student Teaching in Agricultural Education. (2-12). Credit 6. II

Planning for and teaching vocational agriculture in selected high schools in Texas. Laboratory hours include one-half semester student teaching. Prerequisites: Senior classification; completion of the prerequisite sequence of professional courses in agricultural education.

### 441. Agricultural Extension Organization and Methods. (2-2). Credit 3. I

Study of cooperative extension in agriculture and home economics; development, objectives, organization, program building, and methods of teaching. One-week observation with a county extension agent. Prerequisite: Junior or senior classification.

### 485. Problems. Credit 1 to 4. I, II, S

Directed individual study of selected problems in field of agricultural or extension education with emphasis on collection, analysis, and presentation of information. Prerequisite: Approval of Department Head.

## FOR GRADUATES

### 601. Advanced Methods in Agricultural Education. (3-0). Credit 3. I, II, S

Advanced course in methods of teaching. Prerequisite: Professional experience or approval of Department Head.

### 605. Supervised Farming. (3-0). Credit 3. I, II, S

Advanced study of supervised farming and work experience programs. Prerequisite: Professional experience or approval of Department Head.

### 607. Future Farmer and Young Farmer Activities. (3-0). Credit 3. I, II, S

Methods of conducting Future Farmer and Young Farmer activities. Prerequisite: Professional experience or approval of Department Head.

### 610. Methods in Adult and Young Farmer Education. (3-0). Credit 3. I, II, S

Methods of determining and evaluating educational programs in agriculture. Prerequisite: Professional experience or approval of Department Head.

### 613. Administration and Supervision of Agricultural Education. (3-0). Credit 3. I, S

Problems of organization, administration, financing, and supervision of vocational agriculture, and extension work. Prerequisite: Professional experience or approval of Department Head.

### 615. Philosophy of Agricultural Education. (3-0). Credit 3. I, II, S

Study of philosophy and evaluation of education in agriculture. Emphasis on development and use of evaluative criteria. Prerequisite: Professional experience or approval of Department Head.

### 616. Program Building in Agricultural Education. (3-0). Credit 3. I, II, S

Organization of educational programs in agriculture on local, state, and national basis. Prerequisite: Professional experience or approval of Department Head.

**619. Workshop in Agricultural Education. Credit 1 to 3. I, II, S**

Offered for one, two, three, or six weeks or full semester to study selected problems in agricultural or extension education. Consultants are utilized in specialized areas. Prerequisite: Professional experience or approval of Department Head.

**630. Guidance and Counseling for Rural Youth. (3-0). Credit 3. I, II, S**

Analysis of occupational and vocational opportunities for rural youth; techniques of individual group counseling in guidance. Practicum in personality and occupational interest testing. Prerequisite: Approval of Department Head.

**640. Methods of Technological Change. (3-0). Credit 3. I, II, S**

Dynamics of cultural change as theoretical framework for process of planned technological change, methods of planning and implementing change, its effects and how it can be predicted. Prerequisite: Approval of Department Head.

**681. Seminar. (1-0). Credit 1. I, II, S**

Group study and discussion of current developments in agricultural education. Special emphasis given to research and legislation as they affect programs in teacher education, vocational agriculture, and related areas of education. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Studies related to classroom, laboratory, supervised farming work experience, and adult educational activities in agricultural programs. Prerequisite: Approval of Department Head..

**691. Research. Credit 1 or more each semester. I, II, S**

Initiation and completion of research for advanced degree. Prerequisite: Approval of Department Head.

## **Department of Agricultural Engineering**

Professors Hobgood (Head), McCune, Smerdon, Sorenson; Associate Professors Kunze, Wilkes; Assistant Professors Aldred, Stewart; Instructors Beerwinkle, Glass

**201. Farm Power and Machinery. (2-2). Credit 3. I, II**

Construction, operation, adjustments, and servicing of farm engines and tractors. Adaptability, selection, economic utilization, construction, operation, and adjustment of the principal tillage, planting, cultivating, harvesting, and feed processing machines.

**205. Materials in Light Structures. (2-3). Credit 3. I**

Selection and utilization of materials for light structures. Specifications and cost estimation. Prerequisite: E.G. 105.

**208. Farm Machinery. (2-3). Credit 3. II**

Mechanics, design, and materials of farm machinery construction. Rotary power transmission, hydraulic controls, functional requirement, principles of operation, performance characteristics, capacity, economics utilization. Analysis of tillage, planting, harvesting, and handling mechanisms. Prerequisite: Phys. 218.

**213. Food Plant Engineering. (2-3). Credit 3. II**

Elementary mechanics, power transmission, steam and steam boilers, pipes and pipe fitting, refrigeration and insulation, temperature measurement and control, electric motors, disposal of waste products, and mechanical problems as applied to foods and food processing.

**221. Farm Shop. (1-3). Credit 2. I**

A course for students in agricultural education and general agriculture involving carpentry and woodwork, tool sharpening, preparation of simple drawings and bills of materials, blueprint reading, and rafter cutting.

**222. Farm Shop. (1-3). Credit 2. I, II**

A course for students in agricultural education and general agriculture involving electric and gas welding, cold metal work, forging, soldering, pipe fitting, and the preparation and use of concrete.

**301. Agricultural Structures Design. (2-3). Credit 3. I**

Study of basic requirements of livestock buildings and storage structures, including



consideration of sanitation control, environmental control, economy, convenience, and materials application. Basic requirements of farm home. Prerequisite: E.G. 106.

**324. Agricultural Engine and Tractor Design. (2-3). Credit 3. II**

Principles of farm tractor chassis design, traction devices, stability; hitches, power transmission, operation and design of internal combustion engines. Principles of carburetion, ignition, cooling, lubrication, hydraulic systems, and operator's comfort and convenience. Testing and rating procedures. Prerequisites: Math. 307; M.E. 313 or registration therein.

**325. Farm Electricity. (2-2). Credit 3. I, II**

Course for students in agricultural education and general agriculture covering elements of electric current generation and transmission, applications of electric heating, lighting and power, wiring, motors, power rates, meter reading, safety rules and regulations.

**335. Water Control and Utilization. (2-3). Credit 3. I, II**

Elementary surveying, including chaining, leveling, and mapping as applied to farm needs. Water control and utilization, emphasizing irrigation principles and practices, associated problems of drainage, and fundamentals of terracing and farm pond design.

**410. Irrigation and Drainage Engineering. (2-3). Credit 3. II**

Engineering principles of irrigation. Water sources; measurement and distribution of water; irrigation pumps; design of surface and sprinkler irrigation systems; salinity control. Design of surface and subsurface drainage systems; drainage districts and laws. Prerequisites: Agro. 445 or registration therein; C.E. 201, 311.

**413. Agricultural Structures Design. (2-3). Credit 3. II**

Engineering principles of farm structures design; loads, reactions, and force systems; analysis and design of wood and steel beams, light frames and connections. Fundamentals of design of concrete beams, slabs, and columns as applied to agricultural building. Prerequisites: Ag.En. 301; C.E. 305.

**418. Agricultural Process Engineering. (2-3). Credit 3. I**

Engineering principles in agricultural processing. Psychometrics and thermodynamics of air, water, water vapors and pressures, vapor transmission; drying humidification, heating refrigeration, heat transfer, conditioning of air, fluid flow, ventilation, fan laws, and air conveying. Prerequisite: M.E. 323.

**428. Soil and Water Conservation Engineering. (2-3). Credit 3. I**

Engineering principles of soil and water conservation. Rainfall and runoff, soil erosion by water and wind; terrace and terrace outlet design; design of agricultural reservoirs and related structures. Prerequisites: C.E. 201, 311, or registration therein.

**430. Farm Electrification Engineering. (2-3). Credit 3. II**

Principles of electric power in agriculture. Fundamentals of alternating currents and circuits with emphasis on power, energy, resistance, inductance, capacitance, and power factor. Includes theory of magnetism and principles of transformers, generators, and motors. Prerequisite: E.E. 305.

**481. Seminar. (1-0). Credit 1. I**

Review of current literature dealing with agricultural engineering problems presented by staff members and students. Prerequisite: Senior classification.

**482. Seminar. (1-0). Credit 1. II**

Presentation of papers dealing with new developments and results of investigations of problems related to agricultural engineering. Prerequisite: Senior classification.

**485. Problems. Credit 1 to 4. I, II, S**

Selected problems in any phase of agricultural engineering. Credit and specific content dependent upon background, interest, ability, and needs of student enrolled. Individual consultations and reports required. Prerequisites: Junior classification; approval of Department Head.

**FOR GRADUATES**

**601. Instrumentation and Research Methods. (3-0). Credit 3. I**

Analysis of research techniques, scientific method, and design of experiments.

Theory and use of instruments for research, particularly electrical-input transducers. Dimensional analysis, theory of similitude, design of research models, and development of prediction equations. Prerequisite: Approval of instructor.

**602. Irrigation and Drainage. (3-0). Credit 3. II**

Theory and practice in irrigation and drainage. Soil moisture, moisture flow, hydraulics of wells, erosion and sedimentation of structures, and theory of water application methods. Salinity and sodicity and their control. Drainage methods and theory, steady state and none-steady state. Prerequisite: Ag.En. 410 or equivalent.

**603. Agricultural Machinery. (3-0). Credit 3. I**

Functional farm machinery design. Encompasses analysis of problem need, functional requirements, common materials used, design, testing, and production of efficient operational units. Prerequisites: Ag.En. 208; M.E. 313.

**605. Agricultural Structures. (3-0). Credit 3. I**

Structural, environmental, and economic problems encountered in agricultural buildings. Special emphasis on design, considerations for structural materials. Research methods and procedures as applied to agricultural structures. Prerequisites: Ag.En. 413, 418.

**606. Agricultural Process Engineering. (3-0). Credit 3. II**

Engineering principles involved in mechanical handling, cleaning, and sorting, size reduction, conditioning, and storage of agricultural products. Includes use of refrigeration, electric energy, and radiation. Prerequisites: Ag.En. 418, 430; M.E. 323.

**609. Farm Power. (3-0). Credit 3. II**

Theory and principles of operation as applied to internal combustion engines used for agriculture. Emphasis given to application and functional design requirements and testing procedures. Prerequisites: Ag.En. 324; M.E. 313, 323.

**613. Soil and Water Conservation Engineering. (2-3). Credit 3. I**

Soil and water conservation, with emphasis on hydrology of agricultural watersheds, soil erosion theory, functional design of soil and water conservation structures, methods of reducing water losses, and experimental techniques. Prerequisites: Ag.En. 428; C.E. 463.

**685. Problems. Credit 1 to 4 each semester. I, II**

Advanced laboratory or field problems not related to student's thesis. Prerequisite: Graduate classification.

**691. Research. Credit 1 or more each semester. I, II**

Research for thesis or dissertation.

## Department of Air Science

### UNITED STATES AIR FORCE

Professor: Colonel Lee; Associate Professors: Lieutenant Colonels Hopkins, Smith; Majors Carr, Drake, Dudley, Hines, Moore, Walker; Assistant Professors: Captains Anderson, Caleb, Gargus, Williamson

### THE GENERAL MILITARY COURSE

**101. World Military Systems. (1-0). Credit 1. I**

Introductory course examining causes of contemporary world conflict and influence of military forces upon that conflict. Begins with an investigation of the factors from which differing political philosophies have evolved. Briefly considers prime political philosophies motivating segments of society in this century. The means nations develop to pursue objectives and methods of confrontation are followed by detailed study of the U. S. Department of Defense with emphasis on organization and capabilities of the U. S. Air Force.

**102. World Military Systems. (1-0). Credit 1. II**

Continuation of A.S. 101.

**201. World Military Systems. (0-3). Credit 1. I**

Study of military force levels of selected sovereign states to include survey of U. S. Army and U. S. Navy doctrine, mission and employment concepts. Comparative analysis is made of military systems of free world and Communist world, encompassing

NATO, CENTO, SEATO and Soviet Satellite forces. Special emphasis placed upon military organization and capability of USSR and Communist China. Course concludes with study of trends and prospective alignments of world military power.

**202. World Military Systems. (0-3). Credit 1. II**

Continuation of A.S. 201.

**THE PROFESSIONAL OFFICER COURSE**

**301. Growth and Development of Aerospace Power. (3-0). Credit 3. I**

Analysis in depth of growth and development of aerospace power in the United States. Includes survey of strategic concepts of air warfare produced by Douhet, Mitchell, de Seversky and Trenchard. Studies of contemporary U. S. Air Force tactical and strategic doctrines, followed by consideration of astronautics, space operations, and future development of aerospace power. Includes USAF and NASA space programs, vehicles, systems, and problems in space exploration and surveillance.

**302. Growth and Development of Aerospace Power. (3-0). Credit 3. II**

Continuation of A.S. 301.

**401. The Professional Officer. (3-0). Credit 3. I**

Study of professional requirements demanded of the career officer in the USAF. Emphasis placed on principles of leadership and management. Examines military justice system, leadership theory, principles of personnel management, command co-ordination and systems of control. Completes education and motivation of cadet for future role as career officer in the USAF.

**402. The Professional Officer. (3-0). Credit 3. II**

Continuation of A.S. 401.

**Department of Animal Science**

Professors Bonsma, Butler (Head), Cartwright, Dahlberg, Hale, Kunkel, Landmann, Riggs; Associate Professors Cooper, Ellis, King, Shelton, Sorensen, Weseli; Assistant Professors Basset, Breuer, Carpenter, Franke, Morrow, Wythe; Instructors Cunningham, Thomas

**107. General Animal Science. (2-3). Credit 3. I, II**

Introductory course in selection, breeding, feeding, management, and marketing of beef cattle, sheep, Angora goats, and horses. Stresses the importance of the livestock and meats industries.

**302. Trends in Livestock Selection. (2-2). Credit 3. II**

History of livestock breeding including development of breeds and role of breed organizations. Methods of evaluating traits of economic importance in beef cattle, swine, sheep, goats, and horses and selection programs based on records of performance and visual appraisal.

**303. Principles of Animal Nutrition. (3-0). Credit 3. I, II**

General chemical composition of feedstuffs and animals; digestion absorption, metabolism, and function of nutrients; estimation of feedstuffs nutritive value and nutrient requirements of animals; an introduction to ration formulation. Prerequisites: Chem. 232 or 228 or enrollment therein.

**306. Animal Breeding. (2-2). Credit 3. II; S 1967, 1969**

Genetics applied to selection and mating of livestock. Consideration of gene frequency, heritability, relationship, inbreeding, linebreeding, heterosis, selection indexes; use of individual, pedigree, sib, and progeny records. Prerequisite: Gen. 301.

**307. Meats. (2-3). Credit 3. I, II**

Slaughtering and cutting carcasses of cattle, sheep, and hogs. Factors affecting quality, palatability, and economy in selection of meats. Prerequisite: An.Sc. 107 or approval of Department Head.

**309. Feeds and Feeding. (2-2). Credit 3. I, II**

Study of principal feedstuffs used in livestock enterprises. Application of basic nutrients to needs of different species of livestock is stressed. Formulating rations;



methods of feeding; feed control laws and feeding investigations are presented. Prerequisite: An.Sc. 303.

**313. Horse Management and Training. (1-2). Credit 2. I**

Breeding, feeding, management, and training of stock and pleasure horses; growing and developing foals; anatomy; unsoundness; parasites and diseases; stables and equipment; shoeing; fitting for show and sale. Prerequisite: Junior classification.

**315. Livestock Judging. (1-3). Credit 2. I**

Detailed consideration of factors involved in selection and evaluation of beef cattle, swine, sheep, and quarter horses. Ability to present accurate, clear, and concise reasons is stressed. Prerequisite: An.Sc. 107 or approval of instructor.

**317. Meats Judging. (1-3). Credit 2. I**

Detailed consideration of factors involved in selection and grading of carcasses and wholesale cuts of beef, pork, and lamb. Prerequisite: An.Sc. 107 or approval of instructor.

**320. Animal Nutrition and Feeding. (3-0). Credit 3. II**

Consideration of biochemical and physiological aspects of animal nutrition and role of nutrients. Nutritional requirements of farm animals. Study of feedstuffs and formulation of rations to supply nutritional requirements. For students of Veterinary Medicine. Prerequisite: B.N. 312.

**406. Beef Cattle Production. (2-2). Credit 3. I 1965, 1966, 1967; II 1965, 1966, 1967; S 1966**

Consideration of application of principles involved in breeding, feeding, management, disease, and parasite control and marketing of beef cattle. Prerequisite: An.Sc. 303.

**407. Meat Science and Technology. (2-2). Credit 3. II 1965, 1967; S 1966**

Various physical, chemical, microbiological, and other related characteristics of meat and their implications in preparation of commercial meat products. Prerequisites: An.Sc. 307; Chem. 232; or approval of Department Head.

**412. Swine Production. (2-2). Credit 3. I 1965, 1966; S 1967**

Applications of breeding, feeding, sanitation and disease control, management, and marketing to breeding herd and market classes. Use of forage crops; fitting and showing; records. Prerequisite: An.Sc. 303.

**414. Sheep, Goats, and Fiber Technology. (3-2). Credit 4. II**

Methods of management; selection, culling; marketing, environmental factors affecting kid and lamb production; care and feeding flocks. Wool and mohair grading, physical and chemical properties, processing, judging and appraisal. Prerequisite: An.Sc. 303 or approval of Department Head.

**416. Livestock Management. (1-2). Credit 2. II**

Feeding, breeding, management, and marketing of beef cattle, sheep, swine, and horses. Especially designed for agricultural education majors. Prerequisite: An.Sc. 303.

**433. Reproduction in Farm Animals. (2-2). Credit 3. I 1965, 1966, 1967; II 1965, 1966, 1967; S 1966**

Physiological approach to reproductive processes in farm animals. Study includes hormones; estrus cycles; ovulation; gestation; pregnancy tests; sperm physiology; collection and storage of semen; causes of sterility in females and males. Prerequisite: V.A. 202 or approval of Department Head.

**437. Marketing and Grading of Livestock and Meats. (2-2). Credit 3. I, II**

Factors determining market classes and grades of feeder, stocker, and slaughter animals; grading feeder, stocker, and slaughter animals; marketing machinery and handling market livestock; purebred sales; shipping losses; shrinkage; fills. Prerequisite: Senior classification.

**442. Advanced Livestock Judging. (0-3). Credit 1. II**

Advanced course in selection of breeding livestock and evaluation of slaughter livestock. Live animal evaluation related to carcass desirability. Training is given in methods of conducting livestock judging contests. Prerequisite: An.Sc. 315 or approval of Department Head.

**444. Large Animal Nutrition. (3-0). Credit 3. II 1965, 1966; S, 1967**

Study of biochemical and physiological bases for nutritional requirements of non-ruminant and ruminant mammals. Historical consideration of animal nutrition and modern trends in nutritional research. Prerequisites: An.Sc. 303; P.S. 411; or approval of Department Head.

**447. Advanced Meat Selection. (0-3). Credit 1. II**

Advanced course in selection and evaluation of carcasses and wholesale cuts of beef, pork, and lamb as they are correlated with live animal evaluation. Prerequisite: An.Sc. 317 or approval of Department Head.

**481. Seminar. (1-0). Credit 1. I, II**

Review of current literature and research problems related to livestock industry. Prominent men in field of animal husbandry may be invited to conduct seminar. For senior students in animal science.

**485. Problems. Credit 1 to 4. I, II, S**

Directed individual study of selected problem in field of animal science. Prerequisites: Senior classification; approval of Department Head.

**FOR GRADUATES****600. Advanced Livestock Management. Credit 3. S**

Special 3-week workshop course for teachers of vocational agriculture to be offered during summer. Includes problems in all phases of animal production selected by group under supervision of instructor.

**604. Ruminant Nutrition. (3-0). Credit 3. I, S**

Survey of current knowledge and concepts in ruminant physiology and biochemistry, their literature and experimental basis and relation to current and future nutrition practice and investigation. Basis, applications, and limitations of methods and techniques in ruminant nutrition research. Prerequisites: An.Sc. 444; B.N. 410 or 611 and/or approval of Department Head.

**605, 606. Advancements in Beef Cattle Production. (3-0). Credit 3 each semester. I 1965, 1967; S 1966; II 1965, 1967; S 1966**

Review of research relating to various phases of cattle production. Evaluation of research application of basic principles to nutrition, animal breeding, disease control, and management of beef cattle. Prerequisites: An.Sc. 306, 406, or approval of Department Head.

**607. Meat Science and Research Techniques. (2-2). Credit 3. II 1966, 1968**

Emphasizes biochemical, histological, anatomical, and physical factors associated with transformation of muscle cell into meat. Prerequisite: An.Sc. 407 or approval of Department Head.

**616. Animal Genetics. (3-3). Credit 4. II 1966, 1968; S 1967**

Population and quantitative genetics as related to improvement of individuals or groups within species. Consideration of courses of change in gene frequency, selection methods, mating systems, and estimation of genetic parameters. Prerequisites: Gen. 603; Stat. 406.

**619, 620. Advancements in Sheep and Angora Goat Production. (3-0). Credit 3 each semester. I 1967; S 1965, II 1967**

Review of research relating to various phases of sheep and Angora goat enterprise. Evaluation of research; fitting sheep and Angora goats to whole farm and ranch system. Special attention to over-all economic operation. Prerequisites: An.Sc. 306, 414; or approval of Department Head.

**621, 622. Advancements in Swine Production. (3-0). Credit 3 each semester. I 1965; S 1966; II 1965; S 1966**

Review of research relating to various phases of swine enterprise. Evaluation of research; fitting swine to whole farm system. Special attention to over-all economic operation. Prerequisites: An.Sc. 306, 412; or approval of Department Head.

**628. Animal Breeding. (2-0). Credit 2. I 1967, 1969.**

Survey of current status of knowledge in field through critical review of literature emphasizing recent developments. Attention focused on methods and techniques

for animal breeding and quantitative genetic research. Prerequisite: An.Sc. 616.

**631. Physiology of Reproduction. (2-2). Credit 3. II 1966, 1967; S 1965**

Critique of scientific literature on reproduction. Students compile, evaluate, and summarize literature. Research project proposals are formulated and evaluated. Current topics are discussed and experimental surgery is conducted in area of reproduction. Prerequisite: An.Sc. 433.

**681. Seminar. (1-0). Credit 1 each semester. I 1965, 1967; II 1965, 1966, 1967; S 1966.**

Important current developments in field of animal science. Review of current literature and presentation of papers on selected animal science topics. Prerequisites: Graduate classification; major in animal science.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Advanced studies in animal science problems and procedures. Problems assigned according to experience, interest, and needs of individual student. Registration by approval of Department Head. Prerequisite: Graduate classification.

**691. Research. Credit 1 or more each semester. I, II, S**

Investigations leading to student's thesis or dissertation in fields of animal production, meats, wool and mohair, nutrition, inheritance of farm animals, and physiology of reproduction. Prerequisite: Graduate classification.

## School of Architecture

Professors Holleman, Romieniec (Chairman), Rotsch, Strode, Vrooman, White; Associate Professor Marsh; Assistant Professors Clampitt, Fairey, Harper, Hutton, Kellett, Newton, Pate, Patterson, Stacell, Steward, Walden, Woodcock; Instructors Allen, Greer; Lecturer Donaldson

### ARCHITECTURE

**101. Design I. (0-6). Credit 2. I, S**

Analysis and application of principles of design, with emphasis on visual elements and basic concept of their organization.

**102. Design I. (0-6). Credit 2. II, S**

Extension of Arch. 101. Further study and application of principles of design, with emphasis on proper use of materials in basic order of space. Prerequisite: Arch. 101.

**115. Architectural Graphics. (1-3). Credit 2. I, S**

Drafting techniques; principles of shades and shadows; perspective drawing.

**116. Architectural Graphics. (1-3). Credit 2. II, S**

Continuation of Arch. 115; perspective drawing; techniques of architectural delineation and graphic design. Prerequisite: Arch. 115.

**201. Design II. (0-12). Credit 4. I**

Extension of first-year design principles and graphics. Studies of structures and structural materials. Site and building relationships. Design of simple buildings. Color selection. Prerequisites: Arch. 102, 116.

**202. Design II. (0-12). Credit 4. II**

Continuation of Arch. 201. More thorough detailing of design solutions, especially in small buildings. Prerequisites: Arch. 201, 205.

**205. Graphic Art. (0-6). Credit 2. I, S**

Application of principles of design to graphic art concepts, media and techniques. Prerequisites: Arch. 102 for architectural students; equivalent experience preferred for others.

**206. Graphic Art. (0-6). Credit 2. II, S**

Continuation of Arch. 205. Further application of principles of design to graphic art concepts, media and techniques. Prerequisite: Arch. 205 or equivalent.

**227. Structural Principles. (3-0). Credit 3. I**

(For Design Students) Examination of structural systems and their structural, economic, and esthetic suitability as applied to architectural problems. Review of first



year mathematics and an introduction to calculus as applied to structural design. Prerequisites: Math. 102, 116.

**228. Elements of Mechanics. (3-0). Credit 3. II**

Analysis of external effects of force system acting on body at rest. Determination of section properties with emphasis leading to architectural structures. Prerequisite: Arch. 227 or Math. 223.

**253. Technology of Materials. (2-0). Credit 2. I**

Study of materials of construction, their properties, manufacture, characteristics, and uses. Prerequisite: Sophomore classification.

**254. Technology of Materials. (2-0). Credit 2. II**

Selection of materials, methods of construction. Prerequisite: Arch. 253.

**301. Design III. (0-15). Credit 5. I**

Intermediate design stressing complete solutions to individual problems. Emphasis on concept, methods, and materials of construction. Seminars dealing with architectural and related design fields. Prerequisite: Arch. 202.

**302. Design III. (0-15). Credit 5. II**

Further studies in intermediate design enlarging upon Arch. 301. Prerequisite: Arch. 301.

**305. Graphic Art. (0-6). Credit 2. I**

Continuation of Arch. 206. Advanced application of principles of design to graphic art concepts, media and techniques. Prerequisite: Arch. 206 or equivalent.

**306. Graphic Art. (0-6). Credit 2. II**

Continuation of Arch. 305. Advanced application of principles of design to graphic art concepts, media and techniques. Prerequisite: Arch. 305 or equivalent.

**325. Survey of Contemporary Art. (1-0). Credit 1. I**

Survey of development of contemporary art; objectives, terminology, idioms, techniques, and media of painting, sculpture and graphic arts; their relation to architecture and allied arts. Prerequisites: Junior classification for architecture students; sophomore classification for others.

**326. Survey of Contemporary Art. (1-0). Credit 1. II**

Extension of Arch. 325, with emphasis on relating contemporary art trends to cultural and technological developments. Prerequisite: Arch 325 or equivalent.

**327. Basic Structures. (3-0). Credit 3. I**

Fundamentals of strength of materials with emphasis on their application to architectural structures. Prerequisite: Arch. 228.

**328. Steel Structures. (3-0). Credit 3. II**

Application of principles of statics and strength of materials to design of architectural steel structures. Prerequisite: Arch. 327.

**331. Mechanics and Materials. (2-3). Credit 3. I**

Terminal course designed to acquaint student with general principles of mechanics and strength of materials and to give him some facility in their application to simple framing systems. (For students in Industrial Education.) Prerequisites: M.E. 101; Phys. 201.

**335. Mechanical and Electrical Equipment for Buildings. (3-0). Credit 3. I**

Study of systems of mechanical and electrical equipment and their components. Various systems of plumbing, piping, heating, cooling, electrical distribution and wiring studied in their relation to building construction. Prerequisites: Phys. 202; junior classification.

**336. Mechanical and Electrical Equipment for Buildings. (3-0). Credit 3. II**

Continuation of Arch. 335. Further study is made of components of mechanical and electrical equipment as to their logical applications in completed systems of plumbing, space conditioning, and electrical wiring. Prerequisite: Arch. 335.

**339. Art and Civilization. (3-0). Credit 3. I**

Historical survey of cultures of man with respect to art and architecture. Prereq-

quisite: Junior classification.

**340. History of Architecture. (3-0). Credit 3. II**

Historical study of development of architecture from Pre-Classic through Greek and Roman Classic, Early Christian, Byzantine, Saracenic, and Romanesque periods. Prerequisites: Arch. 339 for students in architecture; junior classification for others.

**401. Design IV. (0-15). Credit 5. I**

Architectural and planning problems, with emphasis on analysis, research and design. Study of relationship of architecture, landscape architecture, city and regional planning, and other related design fields. Prerequisite: Arch. 302.

**402. Design IV. (0-15). Credit 5. II**

Continuation of Arch. 401, with architectural and planning problems of a more complex nature. Prerequisite: Arch. 401.

**427. Concrete Structures. (3-0). Credit 3. I, S**

Study of reinforced concrete for architectural structures; analysis and design; systems of forming. Prerequisite: Arch. 328.

**428. Roof Structures. (3-0). Credit 3. II, S**

Analysis and design of conventional roof systems; roof trusses, beams and columns, and current roof deck systems. Prerequisite: Arch. 328.

**433. Architectural Environment. (3-0). Credit 3. I, II**

Study of environmental factors related to architectural design in terms of natural lighting, natural ventilation, and sound. Prerequisites: Phys. 202; junior classification.

**439. History of Architecture. (3-0). Credit 3. I**

Historical study of development of architecture from Gothic through Renaissance and Post-Renaissance periods of Europe. Prerequisite: Arch. 340.

**440. History of Architecture. (3-0). Credit 3. II**

Historical study of American Period architecture; background, principles, philosophies, and significant figures of Contemporary Movement in America and Europe. Prerequisite: Arch. 439.

**454. Specifications and Working Drawings. (1-6). Credit 3. I, II**

Detailed specifications; supervision and superintendence; building laws and codes; working drawings. Prerequisites: Arch. 202, 254.

**500. Summer Practice. Twelve weeks; required; no credit. S**

Summer practice in architectural offices or with building contractors as student may be registered in Design or Construction curriculum. Required previous to registration for fifth year.

**501. Design V. (0-15). Credit 5. I**

Advanced architectural and planning problems, with emphasis on analysis, programming, research, site study, concept, consideration of related design fields, client contact and promotion. Prerequisite: Arch. 402.

**502. Design V. (0-15). Credit 5. II**

Continuation of Arch. 501; problems of more complex nature, with emphasis on awareness of office practice. Prerequisite: Arch. 501.

**527. Structural Systems. (3-0). Credit 3. I**

Advanced studies in systems of architectural structures. Prerequisites: Arch. 427, 428.

**528. Structural Systems. (3-0). Credit 3. II**

Study of structural problems as related to actual professional practice; special consideration of design factors, new materials, codes, economy, specification surveys of costs. Prerequisite: Arch. 527.

**554. Professional Practice. (2-0). Credit 2. I, II**

To familiarize student with usual problems of office practice, professional relations, ethics, building law, and contracts. Prerequisite: Senior classification.

**556. City Planning. (2-3). Credit 3. II**

Survey of planning principles and procedures; legal aspects; physical and social

development of city; housing. Prerequisite: Senior classification.

**581. Seminar. (1-0). Credit 1. II**

Seminars presented orally by students, faculty, and professional people, with subjects relating to architecture and construction of buildings. Prerequisite: Fifth year classification.

**585. Problems. Credit 1 to 5. I, II, S**

Special projects in architecture, landscape architecture, or construction. Project must be approved by Chairman of School of Architecture. Prerequisites: Fifth year classification in architecture or senior classification in landscape architecture; approval of Chairman of School.

## FOR GRADUATES

**627. Contemporary and Creative Structures. (2-2). Credit 3. I**

Studies and analyses of contemporary and creative structures as related to architectural design, with emphasis on esthetic considerations, structural limitations and design, functional use, construction procedures and estimates of cost. Prerequisite: Arch. 528 or equivalent.

**628. Contemporary and Creative Structures. (2-2). Credit 3. II**

Continuation of Arch. 627. Studies and analyses of contemporary and creative structures as related to architectural design with emphasis on esthetic considerations, structural limitations and design, functional use, construction procedures, and estimates of cost. Prerequisite: Arch. 627.

**629, 630. History and Archaeology. (2-0). Credit 2 each semester. I, II**

Individual problems of study and research in field of American architecture and archaeology.

**681. Seminar. (1-0). Credit 1 each semester. I, II, S**

Review of current work in architecture; original presentation on selected topics.

**685. Problems. Credit 1 to 4. I, II, S**

Individual problems involving application of theory and practice in design and construction of buildings and groups of buildings.

**691. Research. Credit 2 to 4 each semester. I, II, S**

Research for thesis.

## LANDSCAPE ARCHITECTURE

**201. History of Landscape Design. (3-0). Credit 3. II**

Study of art of landscape design from earliest efforts to present day. Lectures, reference reading, library sketches, and reports.

**300. Summer Practice. Ten weeks, required. No credit. S**

Approved summer practice with recognized landscape architect or nursery.

**304. Landscape Construction. (2-3). Credit 3. I**

Treatment of various phases of work included in landscape development. Finish grading, drainage, and preparation of detailed drawings. Field practice in construction phases. Prerequisite: C.E. 201.

**305. Planting Design. (1-3). Credit 2. II**

Use of plant materials in composition of landscape design. Study of mass form and texture of plant materials in relation to one another as well as to structures and site development. Plans, sketches, and models. Prerequisite: Flor. 307; Land. 320.

**320. Landscape Design I. (0-12). Credit 4. I**

Delineation of landscape forms; drafting, lettering, and introductory composition, analysis and solution of typical site problems. Prerequisites: Arch. 102, 116; Flor. 307.

**321. Landscape Design II. (0-12). Credit 4. II**

Second course in landscape design. Arranged to give general knowledge of various problems met in practice of landscape architecture, including private, semi-public, and public areas. Prerequisites: C.E. 201; Land. 320.



**404. Landscape Construction. (2-3). Credit 3. I**

Continuation of Land. 304. More advanced problems in landscape development. Prerequisite: Land. 304.

**411. Landscape Design for the Architect and Engineer. (2-2). Credit 3. I**

Study of technical requirements involved in landscape development of residential, industrial, and other outdoor areas. Special emphasis on relationship of architectural and engineering professions to such developments. Not open to students majoring in landscape architecture.

**420. Landscape Design III. (1-15). Credit 6. I**

Major landscape design problems and their respective applications. Private estates, parks, subdivisions, and other private and public areas. Plans, sketches, and models. Prerequisite: Land. 321.

**421. Landscape Design IV. (1-15). Credit 6. II**

Advanced landscape design. Continuation of Land. 420. More advanced problems are assigned with added emphasis on city and regional planning. Prerequisite: Land. 420.

### **Department of Biochemistry and Nutrition**

Professors Couch, Kunkel, Landmann, Lyman (Head), Prescott, Reiser, Richardson; Associate Professors Camp, Dieckert, Whitehouse; Assistant Professors Daron, Parks, Price; Instructor Thomas; Lecturer Crookshank

**312. Veterinary Physiological Chemistry. (3-6). Credit 5. I**

Study of the chemical nature of physiological processes, including synthesis and breakdown of body tissues and chemical changes undergone by metabolites from ingestion to excretion. Prerequisite: Chem. 228.

**401. Human Nutrition. (3-0). Credit 3. I**

Study of the functions of food constituents in health and in physiological stress. Economic, national, and international aspects of human nutrition. Prerequisite: Junior classification.

**410. Introductory Biochemistry. (3-3). Credit 4. I, S**

Chemistry of the major constituents of living organisms. Biophysical and biochemical processes in plants and animals are stressed. Laboratory work includes application of quantitative analytical procedures to plant and animal tissues and fluids. Prerequisites: Chem. 223, and 231 or 228.

**430. Electron Microscopy. (2-3). Credit 3. II**

Principles and laboratory practice in electron microscopy and electron diffraction. Applications in all technical departments of the University are included. Prerequisite: Senior or graduate classification in any University department, or approval of instructor.

**485. Problems. Credit 1 to 4. I, II, S**

For advanced undergraduates, to permit laboratory investigations or study of subject matter not included in established courses. Prerequisite: Approval of Department Head.

(See An.Sc. 444 and P.S. 411 for descriptions of related courses.)

### **FOR GRADUATES**

**611. General Biochemistry. (3-0). Credit 3. I**

Chemistry of the principal constituents of living cells, with introduction to intermediary metabolism. Prerequisites: Chem. 228, 316, 318.

**612. Laboratory Procedures in Biochemistry. (0-6). Credit 2. I**

Laboratory course designed to familiarize student with application of chemical and biological methods to solution of fundamental biochemical problems. Prerequisite: B.N. 611 or registration therein.

**613. Vitamins. (3-0). Credit 3. II**

Role of vitamins in animal nutrition and metabolism. Occurrence in plant and animal tissues. Specific functions of vitamins in enzyme systems. Prerequisite: Chem. 228.

**614. The Determination of Vitamins and Minerals. (0-3). Credit 1. II**

Laboratory course designed to familiarize student with methods for determination of vitamins and minerals in biological materials. Prerequisite: B.N. 613 or registration therein.

**615. Experimental Animal Procedures. (0-3). Credit 1. II**

Laboratory course involving management, preparation of purified rations, and production and cure of nutritional diseases. Prerequisite: B.N. 614 or registration therein.

**618. Chemistry and Metabolism of Lipids. (2-0). Credit 2. II**

Advanced course in lipid chemistry and metabolism. Prerequisite: B.N. 611.

**619. Proteins. (2-0). Credit 2. I**

Advanced studies on chemical, physical, and biological properties of proteins. Particular emphasis placed on biological synthesis and metabolism of proteins. Prerequisite: B.N. 611.

**620. Advanced Biochemical Techniques. (0-6). Credit 2. S**

Laboratory course using special techniques and instruments in isolation, identification, and analysis of biological compounds. Prerequisites: B.N. 612, 624.

**624. Enzymes. (2-0). Credit 2. II**

General principles of enzyme chemistry. Physical chemistry of enzyme action. Types of enzymes and coenzymes. Enzymes in patterns of metabolism. Prerequisites: B.N. 611; Chem. 324 or 342; or approval of instructor.

**626. Radioisotopes Techniques. (2-3). Credit 3. I**

General course on the nature and utilization of isotopes in chemical and biochemical studies. History, general properties of nuclei, nuclear reactions, radiations; health physics and instrumentation. Prerequisites: Chem. 316, 317; Phys. 201, 202.

**627. Mineral Nutrition and Metabolism. (2-0). Credit 2. II**

Study of the role of minerals in animal nutrition with emphasis on physiological functions, biochemical interrelationships with other minerals and other nutrients, deficiency symptoms and nutritional significance. Prerequisite: B.N. 410 or 611.

**630. Metabolism. (3-0). Credit 3. II**

Descriptive consideration of various chemical pathways of metabolism. Prerequisites: B.N. 611, 613.

**632. Radioactive Tracer Techniques in Metabolism. (1-3). Credit 2. II**

Use of isotopes in measuring metabolic pool, precursor-product relationships, isotopic competition, cycles and intermediates, permeability, adsorption and absorption, and assay of common elements. Prerequisites: B.N. 612, 626, or approval of instructor.

**634. Techniques in Lipid Chemistry. (0-6). Credit 2. II**

Designed to acquaint student with recently developed techniques in chemical and biochemical investigations on lipids. Prerequisites: B.N. 612, 618 or registration therein.

**640. Clinical Chemistry. (2-6). Credit 4. II**

Study of the quantitative distribution of body constituents and their physiological interpretations. Prerequisites: B.N. 312 or 410 or 611, or Biol. 433, or V.P.P. 427.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Study and discussion of original articles in biochemistry and nutrition and related fields designed to broaden understanding of problems in the field and to stimulate research.

**685. Problems. Credit 1 or more each semester. I, II, S**

Advanced course in biochemical laboratory procedures including preparations and instrumentation. Problems assigned according to experience, interests, and needs of individual student.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis or dissertation. Laboratory facilities available for original

investigations in various phases of biochemistry and nutrition. Prerequisite: Approval of major advisor.

(See Gen. 631 for full description of related course.)

### Department of Biology

Professors Brown, Dillon, Dobson, Gravett, Hopkins, Krise, Mackin (Head), Read, Sperry; Associate Professors Hupp, Medlen, Taber; Assistant Professors Clark, McLain, Sweet; Instructors Boswell, Flournoy, Hughes, Massey, Murad

Courses in the biological sciences administered by the Department of Biology include sequential programs in botany, microbiology, and zoology. All courses, irrespective of subject matter area, bear the departmental designation (Biology), and a course number from a single numerical sequence. The nature of the offerings is more clearly indicated, however, by the subject matter grouping shown on the following pages.

### GENERAL BIOLOGY

#### 115. Survey of Biology. (3-3). Credit 4. I, II

Summarization of biological forms and principles and their impact upon man and his affairs.

#### 330. Life Science. (2-0). Credit 2. I, II

Readings of grouped essays covering major subdivisions of life science together with integrating lectures. Prerequisite: Junior classification. (Not open to those with more than 7 hours of credit in biology.)

#### 337. Organic Evolution. (2-0). Credit 2. I, II

Study of evidences of evolution of plants, animals, and man. Phylogeny and inter-relationships of living things, main lines of evolution, origin of species; man and the future considered.

#### 439. The Development of the Biological Sciences. (2-0). Credit 2. II

Survey of beginnings and development of biological discoveries; lives and contributions of outstanding biologists. Prerequisite: Twelve hours of biological science or approval of instructor.

#### 481. Seminar in Biology. (1-0). Credit 1. I

Recent advances. Restricted to senior undergraduate majors in microbiology, botany, or zoology.

#### 482. Seminar in Biology. (1-0). Credit 1. II

Integration of branches of biological science. Restricted to senior undergraduate majors in microbiology, botany or zoology.

#### 485. Biological Problems. Credit 1 to 4. I, II

Problems in various phases of plant, animal, and bacteriological science. Prerequisites: Junior classification; approval of ranking professor in field chosen.

### FOR GRADUATES

#### 600. Teaching of High School Biology. (2-3). Credit 3. S

Study of techniques of teaching biology in secondary school. Laboratory emphasizes exercises useful in high school biology laboratory. Prerequisite: Approval of Heads of Biology and Education and Psychology Departments.

#### 654. Radiation Biology. (3-0). Credit 3. I

Review of physical theory of ionizing radiations important to living organisms; X-ray, gamma, alpha, beta and neutron. Survey of effects of ionizing radiations on biological systems. Prerequisite: Graduate classification in biological or agricultural science.

#### 655. Mammalian Radiation Biology. (3-0). Credit 3. II

Lecture and demonstration on effects of X-ray, gamma, alpha, beta, and neutron radiation on mammalian organisms. Both early and delayed effects emphasized. Use of radioactive materials in mammalian biology will be introduced. Prerequisites: Biol. 433, 434, 654.



**660. Aquatic Ecology. (2-3). Credit 3. II**

Study of fresh water as an environment; its physical and chemical characteristics and plant and animal communities which inhabit it. Prerequisites: Biol. 327, 435 or equivalent; graduate classification or approval of instructor.

**661. Cellular Physiology. (2-3). Credit 3. II**

Consideration of physiochemical nature of cell and its relationship to environment with emphasis on conversion of energy and matter as required by cell as living unit. Prerequisites: Graduate classification in biology or animal or plant science; approval of instructor.

**681. Seminar. (1-0). Credit 1. I, II**

Detailed reports on specific topics in field chosen. Prerequisite: Graduate classification in appropriate field.

**685. Problems. Credit 1 to 4 each semester. I, II**

Limited investigations in fields other than those chosen for thesis or dissertation.

**691. Research. Credit 1 or more each semester. I, II**

Research for thesis or dissertation. Prerequisite: Approval of ranking professor in field chosen.

**BOTANY****101. General Botany of Seed Plants. (2-3). Credit 3. I, II**

The plant as a living unit; external and internal structures in relation to life processes; reproduction and life history.

**102. Taxonomy of Flowering Plants. (2-3). Credit 3. I, II**

Designed to give training in use of keys and in identification of flowering plants, family characteristics and relationships, and other applied phases of plant science. Prerequisite: Biol. 101.

**327. Fundamental Plant Morphology. (2-3). Credit 3. I**

Structural, reproductive, and taxonomic features of representatives of major plant groups, with particular attention to groups not covered in Biol. 101. Prerequisite: Biol. 101.

**353. Mycology. (2-3). Credit 3. II**

Introduction to study of fungi, including structure, reproduction, ecological relationships, and taxonomic aspects. Prerequisite: Biol. 101 or approval of instructor. (Offered in 1964-65 and in alternate years thereafter.)

**453. Plant Anatomy. (2-3). Credit 3. I**

Fundamental anatomy of vegetative and reproductive organs of plant with emphasis on development of tissue types. Prerequisite: Six hours of plant sciences including Biol. 327 or equivalent.

**FOR GRADUATES****608. Ecology and Taxonomy of the Algae. (2-6). Credit 4. I**

Study of form, structure, reproduction, and ecology of the algae. Prerequisite: Biol. 327 or 353 or approval of instructor. (Offered in 1964-65 and in alternate years thereafter.)

**615. Cytology. (2-6). Credit 4. I**

Intensive study of organization and activities of cell, with emphasis on topics related to cytogenetics and cytotaxonomy. Prerequisites: Gen. 301; approval of instructor.

**619. Systematic Botany. (2-6). Credit 4. I**

Phylogenetic considerations and criteria. History of classification. Nomenclature and identification. Field and herbarium techniques. Prerequisites: Biol. 102, 327, or approval of instructor.

**620. Systematic Botany. (2-6). Credit 4. II**

Survey of Angiosperms. Biosystematics and modern taxonomy. Procedures in monograph preparation. Monographers. Field and herbarium techniques. Prerequisite: Biol. 619.

**623. Plant Morphology. (2-6). Credit 4. II**

Study of anatomical, reproductive, and ontogenetic and phylogenetic features of representative vascular plants. Prerequisite: Biol. 327 or equivalent.

**651. Mycology. (2-6). Credit 4. II**

Detailed studies of fungi, with emphasis on life cycles of representative forms; genetics and cytology; taxonomy; ecology. Prerequisite: Biol. 353 or approval of instructor. (Offered in 1965-66 and in alternate years thereafter.)

**MICROBIOLOGY****206. Introductory Microbiology. (2-4). Credit 3. I, II**

Relation of microorganisms to agriculture, industry, and health of man, animals, and plants. Prerequisites: Chem. 102 or 104; 3 hours of biology.

**351. Fundamentals of Microbiology. (3-4). Credit 4. I**

Basic microbiology; comparative morphology, taxonomy, pathogenesis, ecology, variation, physiology of microorganisms. Prerequisites: Chem. 227; 3 hours of biology; or approval of instructor.

**438. Bacterial Physiology. (2-6). Credit 4. I**

Detailed study of physiological activities of bacteria. Prerequisite: Biol. 351. (Offered in 1964-65 and in alternate years thereafter.)

**457. Bacterial Ecology. (2-6). Credit 4. II**

Relation of bacteria to their environment, especially to other microorganisms. Methods of isolation, identification, and differentiation. Prerequisite: Biol. 351. (Offered in 1965-66 and in alternate years thereafter.)

(See Biol. 553, 661; D.S. 320, 326; and V.Mi. 301 for descriptions of related courses.)

**FOR GRADUATES****635. Physiology of Microorganisms. (2-6). Credit 4. I**

Advanced consideration of physiological activities of bacteria with special emphasis on metabolism. Prerequisite: B.N. 312 or 410. (Offered in 1964-65 and in alternate years thereafter.)

**647. Industrial Microbiology. (2-6). Credit 4. II**

Microorganism as basis of industrial processes. Practice includes antibiotic assay; analysis of products of metabolism, and fermentation balances. Prerequisites: B.N. 312 or 410. (Offered in 1965-66 and in alternate years thereafter.)

(See Biol. 608, 630, 651; P.P.P. 607, 618, 620 for descriptions of related courses.)

**ZOOLOGY****107. Vertebrate Zoology. (2-3). Credit 3. I, II**

Structure, physiology, and development of animals; emphasis on biology of vertebrates.

**108. Invertebrate Zoology. (2-3). Credit 3. I, II**

Classification, comparison, anatomy, and physiology of invertebrate animals. Specimens from more important invertebrate phyla studied in laboratory. Prerequisite: Biol. 107 or approval of instructor.

**217. Comparative Anatomy of Vertebrates. (2-4). Credit 3. I**

Comparative anatomy of Prochordates and lower vertebrates through Reptilia. Laboratory animals: Molgula, Dolichoglossus, Amphioxus, Squalus, Necturus, and Phrynosoma. Prerequisites: Biol. 107, 108.

**218. Comparative Anatomy of Vertebrates. (2-4). Credit 3. II**

Comparative anatomy of birds and mammals. Laboratory animals: chicken and cat. Prerequisite: Biol. 217.

**219. Mammalian Anatomy. (2-3). Credit 3. I**

Principles of normal anatomy of cat and man. Nature and causes of mechanical injuries of man. Prerequisite: Biol. 107.

**220. Physiology and Hygiene. (2-3). Credit 3. II**

Continuation of Biol. 219. Normal and abnormal physiology of man. Prerequisite: Biol. 219.

**325. Physical Anthropology. (3-0). Credit 3. II**

Man's relation to and position in animal kingdom. Physical characteristics of mankind. Fossil and living types. Races and racial characteristics. Prerequisite: Three hours of biological science.

**343. Histology. (2-3). Credit 3. I**

Normal tissues of vertebrate including histogenesis of some. Histogenesis and organography of mammalian tissues reviewed. Prerequisite: Biol. 217.

**344. Embryology. (2-3). Credit 3. II**

Introduction to general and comparative vertebrate embryology; emphasis on early development of frog, chick, and pig. Prerequisite: Biol. 217.

**422. Microtechnique. (1-6). Credit 3. II**

Standard methods in preparation of permanent microscopic slides of plant and animal tissues. Prerequisite: Twelve hours of biological science, including Biol. 343.

**433. General Physiology. (3-3). Credit 4. I**

Fundamental physiology of protoplasm; basic processes and functions of organs and systems. Emphasis placed on digestion, respiration, metabolism, excretion, muscular contraction, and reproduction. Prerequisites: Biol. 107 and either graduate classification, Biol. 218, or equivalent.

**434. Circulatory and Nerve Physiology. (3-3). Credit 4. II**

Comparative functions of circulatory, nervous system, and of organs of special sense. Prerequisites: Biol. 218; or Biol. 107 and senior or graduate classification in an animal science.

**435. Advanced Invertebrate Zoology. (3-3). Credit 4. I**

Morphology, taxonomy, biology, and phylogeny of invertebrate animals. Prerequisite: Biol. 107 or approval of instructor.

**436. Animal Parasitology. (3-3). Credit 4. II**

Study of parasitic worms and protozoa; laboratory methods in parasitology. Prerequisite: Biol. 435 or equivalent.

### FOR GRADUATES

**603. Advanced Vertebrate Zoology. (1-5). Credit 3. II**

Phylogeny of vertebrates based on comparative anatomy, histology, embryology, and distribution. Prerequisites: Biol. 218, 343, 344, or equivalent.

**604. Advanced Embryology. (1-5). Credit 3. I**

Comparative and experimental studies of mechanics of embryonic development. Prerequisites: Biol. 218, 343, 344, or equivalent. (Offered in 1964-65 and in alternate years thereafter.)

**627. Helminthology. (3-3). Credit 4. I**

Study of parasitic worms, especially Trematoda, Cestoda, Nematoda, and Acanthocephala. Prerequisite: Biol. 436. (Offered in 1964-65 and in alternate years thereafter.)

**630. Protozoology. (3-3). Credit 4. I**

Morphology, taxonomy, physiology, reproduction, phylogeny, ecology, and life history of both free living and parasitic protozoa. Prerequisite: Biol. 108. (Offered in 1965-66 and in alternate years thereafter.)

**632. Methods in General Physiology. (2-6). Credit 4. II**

Methods for quantitative study of metabolism, respiration, circulation, excretion, movement, and other basic physiological phenomena. Recent advances in physiological methods presented on seminar basis. Prerequisite: Biol. 433 or equivalent.

**649. Biology of the Endocrine Glands. (3-3). Credit 4. I**

Study of structure, development, comparative anatomy, and physiology of endocrine glands of different animal groups. Prerequisites: Three hours of either anatomy or anatomy and physiology.



**653. Zoogeography. (3-0). Credit 3. II**

Study of distribution of animals during geologic and present times; emphasis on role of ecology and effects of geography upon terrestrial and marine distribution. Prerequisite: Twelve hours of biological sciences, including at least 3 hours of advanced courses.

**656. Analytical Histology. (2-6). Credit 4. II**

Designed to acquaint student with certain quantitative histochemical techniques in plant and animal science as applied to nucleoproteins, carbohydrates, lipids, and enzymes. Prerequisites: Biol. 343 or 453 or equivalent; Chem. 227.

**662. Biology of the Mollusca. (3-3). Credit 4. I, II, S**

Conferences and laboratory work on classification, life history, morphology, physiology, ecology, diseases, parasites, predators, and competitors of molluscs, with special reference to oysters. Prerequisite: B.S. degree in biology or related fields, or approval of instructor.

## School of Business Administration

Professors Goode, Hoyle, Pearson (Head), Stevenson; Associate Professors Burgess, Elkins, Letbetter, Manning, Packerham, Rice, Stewart, Thompson; Assistant Professors Althaus, Cherry, Dozier, Eckles, House, Lowe, Luker, Morrison, O'Connell, Oliver, Porter, Sandstedt, Simons, Tadlock, Van Ingen; Instructors Ames, Cashion, Disinger, Haddox

**105. Introduction to Business. (3-0). Credit 3. I, II, S**

Provides over-all picture of business operation; includes analysis of specialized fields within business organization; identifies role of business in modern society.

**106. Business Organization. (3-0). Credit 3. I, II, S**

Authority, delegation, responsibility; functional analysis of organization and management; organization for production, distribution, and finance. Prerequisite: B.A. 105 or approval of instructor.

**211. Business Law. (3-0). Credit 3. I, II, S**

Nature and scope of law; court system; law of contracts; principal and agent; business organizations, including partnerships and corporations; Texas community property laws. Prerequisite: Sophomore classification.

**212. Business Law. (3-0). Credit 3. I, II, S**

Additional studies in law of business, dealing with bailments, carriers, mortgages, suretyships, negotiable instruments, banks and banking, wills and estates, sales, bankruptcy. Prerequisite: B.A. 211.

**227. Principles of Accounting. (3-3). Credit 4. I, II, S**

Analysis and recording of business transactions; use of journal and ledger; accounting statements; payroll records and payroll taxes; introduction to partnership accounting; special journals and ledgers; voucher system.

**228. Principles of Accounting. (3-3). Credit 4. I, II, S**

Continuation of B.A. 227. Internal control; partnership and corporation accounting; accounting for manufacturing concerns; analysis and interpretation of statements. Prerequisite: B.A. 227.

**303. Statistical Method. (3-3). Credit 4. I, II, S**

Collection, tabulation, presentation, and analysis of data. A study of sampling, graphics, averages, dispersion, skewness, probability and error, index numbers, barometers, correlation. Prerequisite: Math. 102.

**304. Business Cycles and Business Measurements. (3-0). Credit 3. I, II, S**

Empirical and statistical study of economic fluctuations: theory, causes, and control of business cycles; business barometers and forecasting; economic and statistical studies. Prerequisite: B.A. 303.

**310. Credit Management. (3-0). Credit 3. II**

Elements of mercantile and consumer credit; organization of credit department; sources of credit information; collection tools and procedures.

**314. Advertising. (3-0). Credit 3. I, II, S**

Place of advertising in business; advertising media; methods of advertising; consumer habits and psychology; advertising campaigns; cost analysis; legal and ethical problems in advertising. Prerequisite: B.A. 321.

**315. Insurance. (3-0). Credit 3. I, II, S**

Introduction to theory and practice of insurance, including life, fire, automobile, and personal and business risk. Prerequisite: Sophomore classification.

**317. Punch Card Methods. (1-2). Credit 2. I, II**

Instruction and practice in operation of punch card machines for handling of accounting and statistical data. Prerequisites: B.A. 228, 303.

**320. Life Insurance. (3-0). Credit 3. I**

Fundamentals of life insurance and annuities; rate-making, reserves, cash surrender values, dividends, and selection of risks. Prerequisite: B.A. 315.

**321. Marketing. (3-0). Credit 3. I, II, S**

Study of institutions, processes, and problems involved in transferring goods from producers to consumers, with emphasis on economic and social aspects. Prerequisite: Econ. 204.

**322. Property Insurance. (3-0). Credit 3. I**

Principles and practices of property insurance, including fire and allied lines, consequential losses, transportation insurance, multiple-line, and rate-making. Prerequisite: B.A. 315.

**324. Casualty Insurance and Suretyship. (3-0). Credit 3. II**

Principles of casualty insurance and surety bonding; employer's liability insurance; liability risks; theft, disability, aviation, glass, power plant, and credit insurance. Prerequisite: B.A. 315.

**325. Retailing. (3-0). Credit 3. I, II, S**

Fundamental operations of retailing concerns and need for effective coordination of retailing activities. Prerequisite: B.A. 321.

**327. Intermediate Accounting. (2-3). Credit 3. I, S**

Working papers and preparation of statements; correction of books and statements; special phases of corporation accounting; cash and receivables; inventories, investments. Prerequisite: B.A. 228.

**328. Intermediate Accounting. (2-3). Credit 3. II, S**

Investments; tangible and intangible fixed assets; liabilities; reserves; statement analysis; business combinations, reorganizations; price-level impact on financial statements.

**329. Elementary Cost Accounting. (3-0). Credit 3. I, II, S**

Cost accounting principles relating to material, labor, and manufacturing expenses; cost accounting practices and procedures; process cost accounting. Prerequisite: B.A. 228.

**330. Advanced Accounting. (3-0). Credit 3. I, S**

Special phases of partnership accounting; joint ventures; consignments; installment sales, insurance costs; statements of insolvent concerns; home office and branch accounting. Prerequisite: B.A. 328 or registration therein.

**332. Cost Accounting. (3-0). Credit 3. II, S**

Advanced process cost procedures, costing of joint and by-products, estimated cost, standard costs, reports and analysis for cost control, direct costing, break-even analysis. Prerequisite: B.A. 329.

**335. Administrative Accounting. (3-0). Credit 3. I, II, S**

Use of budgets; analysis and interpretation of accounting reports; cost control, and methods of measuring performance. Not open to students majoring in accounting. Prerequisite: B.A. 228.

**337. Data Processing. (2-2). Credit 3. I, II**

Use of electronic computers for recording and reporting, sorting; searching; col-

lating; file maintenance; integrated data processing; coding of information; storage of information. Prerequisite: Junior classification.

**341. Corporaton Finance. (3-0). Credit 3. I, II, S**

Financial practices and financial management of modern business corporation, including cash flow, planning, procurement of funds, management of long-term and working capital. Prerequisite: Econ. 203.

**363. Principles of Management. (3-0). Credit 3. I, S**

Planning, organizing, motivating, and controlling functions of business; coordinated managerial philosophy in production, finance, and distribution; analytical approach to business problems. Prerequisite: Junior classification or approval of instructor.

**403. Income Tax. (3-0). Credit 3. I, II**

Income tax legislation; present income tax law and regulations; treasury decisions, court decisions, and departmental rulings; income tax problems and returns. Prerequisite: B.A. 327.

**406. Managerial Accounting. (3-0). Credit 3. II**

Uses of accounting information by management; emphasis on accounting procedures and reports essential to management. Cost analysis, cost control, budgeting and controllership. Prerequisite: B.A. 329.

**407. Auditing. (3-0). Credit 3. I**

Auditing procedures used by internal auditors and independent public accountants; preparation of working papers. Prerequisites: B.A. 328, 329.

**408. Auditing. (3-0). Credit 3. II**

Continuation of B.A. 407. Preparation of working papers and audit report; case studies involving auditing problems in special situations. Prerequisite: B.A. 407.

**409. Survey of Accounting Principles. (3-0). Credit I, II, S**

Survey of accounting designed for students majoring in engineering and architecture. Accounting procedures, basic cost accounting; preparation and interpretation of financial statements. Not open to students in business administration, agricultural administration, or liberal arts. Prerequisite: Junior classification.

**416. Oil Production Accounting. (3-0). Credit 3. II**

Systems and procedures for development of oil properties, and production of crude oil; intangible development costs, depletion allowance, and oil pipe line operations. Prerequisite: B.A. 228.

**419. Legal Principles Relating to Accounting. (3-0). Credit 3. I, S**

Intensive study of legal principles emphasizing those which arise in practice of accounting. Prerequisite: Senior classification.

**420. Principles of Investment. (3-0). Credit 3. I, II, S**

Investment media and risks; elements of security analysis; determining investment needs and policy; management of portfolio. Prerequisite: B.A. 341.

**422. Personnel Problems of Industry. (3-0). Credit 3. I, II, S**

Relation of worker to his employer; job finding and interviewing; occupational trends; functions and structure of personnel departments; problems of contemporary industrial development. Prerequisite: Junior classification.

**423. Human Relations in Business. (3-0). Credit 3. I, II, S**

Study of problems arising from association of people in work environments. Prerequisites: B.A. 422; Psy. 303.

**427. Insurance Law. (3-0). Credit 3. II**

Law cases on insurance; insurance policies and legal interpretation; technical legal pitfalls; case examples from all forms of insurance coverage; Texas insurance law. Prerequisite: B.A. 211.

**428. Real Estate Titles and Conveyances. (3-0). Credit 3. I, II, S**

Ownership and transfer of titles to real property, including deeds, easements, zoning, building codes and private restrictions; mortgages and liens, building contracts. Prerequisite: B.A. 211.



**430. Cost Accounting Survey. (3-0). Credit 3. II, S**

Introductory cost accounting course for architects, engineers, and agricultural students. Bidding on contracts; cost procedures; process costs and budgets; cost reports. Prerequisite: B.A. 409.

**432. Security Analysis. (3-0). Credit 3. II**

Methods of analyzing individual security issues; financial statement analysis; rights and interests of investors. Prerequisite: B.A. 420.

**434. Problems in Finance. (3-0). Credit 3. II**

Financial problems confronting management of large and small businesses. Case system is used relating legal, accounting, and financial aspects of each situation. Prerequisite: B.A. 341.

**435. Salesmanship. (3-0). Credit 3. I, II, S**

General principles of personal selling with emphasis given to industrial, wholesale, specialty selling and sales engineering. Prerequisite: B.A. 321.

**436. Sales Management. (3-0). Credit 3. II, S**

Problems confronting sales executive; organization of sales departments, product research, selection and recruiting; compensation plans, routing, supervision, and cost analysis. Prerequisite: B.A. 435 or 448.

**437. Applied Life Insurance. (3-0). Credit 3. II**

Legal and social aspects of life insurance; problems of reinsurance, company organization, and financial position; government life insurance; uses of settlement options. Prerequisite: B.A. 320.

**440. Real Estate Fundamentals. (3-0). Credit 3. I**

Basic factors and agencies in modern real estate development; historic, economic, legal, and social aspects of real estate; appraisal financing, and agency management.

**445. Marketing Research. (3-0). Credit 3. I**

Nature and uses of marketing research in business. Methods of collecting and interpreting marketing information and specific application to problems in marketing. Prerequisites: B.A. 303, 321.

**446. Marketing Industrial Products. (2-0). Credit 2. II**

Marketing research, marketing policies, channels of distribution, brand policy, pricing and control of marketing operations as they affect industrial products. Prerequisites: B.A. 303, 321.

**447. Advertising Procedures. (3-0). Credit 3. I**

Advertising procedures for newspapers, magazines, radio, and television; retail, mail order, national, and industrial advertising; advertising agencies; advertising research. Prerequisite: B.A. 314.

**448. Marketing Problems. (3-0). Credit 3. II**

Problems in marketing of industrial and consumer goods; customer relations, channels of distribution, brands, sales promotion, pricing, and legislation. Prerequisite: B.A. 321.

**452. Veterinary Jurisprudence. (3-0). Credit 3. I, II**

Statutes and court decisions pertaining to veterinary medicine. Prepares student for State Board Examination in veterinary law. Prerequisite: Senior classification in College of Veterinary Medicine.

**454. Law of Private Corporations. (3-0). Credit 3. I, II**

Powers and limitations of corporate form of business organization; legal problems in management of corporation; rights of stockholders and creditors. Prerequisite: B.A. 212.

**459. Management Problems. (3-0). Credit 3. I, S**

Case study approach to management problems with emphasis on quantitative analysis and decision making. Prerequisites: B.A. 363 or approval of instructor.

**466. Management Policy. (3-0). Credit 3. II, S**

Policy problems of business organization. Integrates fields of marketing, finance, accounting, economics, law, and insurance into decision making. Prerequisite: Senior

classification in Business Administration.

**601. Statement Analysis. (3-0). Credit 3. II, S**

An analytical study of different kinds of statements for guidance of executives, investors, and creditors; balance sheet and profit and loss ratios. Prerequisite: B.A. 330.

**602. Consolidated Statements. (3-0). Credit 3. II**

Consolidated balance sheets, consolidated income and surplus statements, holding companies, mergers. Prerequisite: B.A. 330.

**605. Accounting Problems. (3-0). Credit 3. I**

Advanced accounting theory and problems dealing primarily with corporation accounting, assets and liabilities, analysis of statements, and cost accounting. Prerequisite: Approval of instructor.

**606. Accounting Problems. (3-0). Credit 3. II**

Continuation of B.A. 605. Topics will deal primarily with partnerships, fiduciaries, home office and branch, insurance, and auditing. Prerequisite: Approval of instructor.

**609. Management Seminar. (3-0). Credit 3. I, S**

Study of organization theory and its application to business systems. Prerequisite: Approval of instructor.

**612. Advanced Taxes. (2-0). Credit 2. II**

Study of special income tax problems of taxpayers; Federal estate and gift taxes; Texas inheritance tax; Texas franchise tax on corporations; claims for refund of taxes. Prerequisite: B.A. 403.

**616. Governmental and Institutional Accounting. (3-0). Credit 3. I, S**

Study of accounting principles and procedures peculiar to governmental units and institutions. Prerequisite: B.A. 328. Econ. 412 recommended.

**622. Trade Regulations. (3-0). Credit 3. II, S**

Governmental control including Federal anti-trust acts; Federal Trade Commission and unauthorized business practices; price discrimination and retail price maintenance. Prerequisite: B.A. 211.

**630. Problems of Corporation Finance. (3-0). Credit 3. I**

Financial problems of corporation are analyzed, including current financing, re-funding operations, dividend policies, and corporate reorganization. Prerequisite: B.A. 341.

**640. Accounting Concepts and Procedures. (3-0). Credit 3.**

Accounting concepts and relationships essential to administrative decisions; use of accounting statements and reports as policy-making and policy-execution tools. Prerequisites: Graduate classification; approval of graduate advisor.

**643. Legal Relationships. (3-0). Credit 3. II, S**

Various relationships based on law encountered by business executive; agreements; circumstantial relationships; and governmental responsibilities. Prerequisites: Graduate classification; approval of graduate advisor.

**646. Business Trends, Fluctuation, and Measurements. (3-0). Credit 3. I, S**

Study of business trends and economic fluctuations; theory; causes and control of cyclical behavior; analytical forecasting; economic and statistical services. Prerequisites: Graduate classification; approval of graduate advisor.

**649. Survey of Marketing. (3-0). Credit 3. I, II, S**

Analysis of marketing functions and institutions; marketing mix related to consumers, trade, and industrial products. Emphasis on terminology and essential concepts. Prerequisites: Graduate classification; approval of graduate advisor.

**652. Financial Management. (3-0). Credit 3. I, II, S**

Financial policies and practices in business firm; finance function, financial control and organization; financial analysis and planning. Prerequisites: Graduate classification; approval of graduate advisor.

**655. Survey of Management. (3-0). Credit 3. I, II, S**

Personnel and production management practices and theories; organization, plant layout, efficiency studies, control administration, personnel methods and techniques, and human relations. Prerequisites: Graduate classification; approval of graduate advisor.

**663. Legal Environment of Business. (3-0). Credit 3. I, S**

Constitutional and legislative enactments; stare decisis and judicial process; regulation of commerce; taxation and regulation of competition, business and labor. Prerequisites: Graduate classification in business administration; approval of graduate advisor.

**666. Quantitative Analysis for Business Decisions. (3-0). Credit 3. II, S**

Quantitative techniques including statistics, inventory control, game theory, capital budgeting, simulation, linear programming, pricing. Prerequisites: Graduate classification in business administration; approval of graduate advisor.

**669. Accounting Theory. (3-0). Credit 3. II, S**

Appraisal of concepts and standards underlying accounting procedures. Includes developments and trends in theory. Prerequisites: Graduate classification in business administration; approval of graduate advisor.

**672. Management Information Systems. (3-0). Credit 3. I, S**

Integrative approach to data processing and management information systems with emphasis on data flow, systems analysis and design, and information economics. Prerequisites: Graduate classification in business administration; approval of graduate advisor.

**675. Marketing Management. (3-0). Credit 3. II, S**

Analysis of marketing as it relates to over-all business objectives; marketing activities integrated with other business functions, analysis, strategy, and tactics. Prerequisites: Graduate classification in business administration; approval of graduate advisor.

**678. Management Accounting. (3-0). Credit 3. I, S**

Problems, cases, and readings; use of accounting data in planning business operations and policies. Prerequisites: Graduate classification in business administration; approval of graduate advisor.

**680. Business Policy. (3-0). Credit 3. I, II, S**

Case study governing functions of production, distribution, and finance; analysis and decision making; a comprehensive business game. Prerequisites: Graduate classification in business administration; approval of graduate advisor.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Critical examination of subject matter presented in current periodicals, recent monographs and bulletins. Separate seminars may be offered in accounting, finance, marketing, management, and statistics.

**685. Problems. Credit 1 to 3 each semester. I, II, S**

Directed study on selected problems using recent developments in business research methods. Prerequisites: Graduate classification; approval of instructor.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis.

## Department of Chemical Engineering

Professors W. D. Harris, Holland (Head), Lindsay, Meinke; Associate Professors Eubank, W. B. Harris; Assistant Professors Davison, Durbin

**204. Elementary Chemical Engineering. (3-0). Credit 3. I, II**

Solution of elementary problems on application of mass balances, energy balances, and equilibrium relationships. Prerequisites: Chem. 102 or 104; Math. 122 or 210 or registration therein.

**204. Unit Operation. (3-0). Credit 3. I, II**

Study of fluid and heat flow, evaporation and drying. Prerequisite: Ch.E. 204.



**314. Unit Operations Laboratory. (0-3). Credit 1. II**

Laboratory work based on Ch.E. 304. Prerequisite: Ch.E. 304.

**409. Oil and Gas Technology. (3-0). Credit 3. I**

Application of principles of chemical engineering to treatment and processing of petroleum and its products. Emphasis on unit operations. Prerequisite: Ch.E. 423.

**423. Unit Operations. (3-0). Credit 3. II, S**

Continuation of Ch.E. 304 covering distillation, gas absorption, filtration, size reduction, separation, and mixing. Prerequisite: Ch.E. 304.

**424. Unit Operations. (3-0). Credit 3. I**

Continuation of Ch.E. 304 and 423, covering drying, crystallization, filtration, mixing, and conveying. Prerequisite: Ch.E. 423.

**426. Plant Design. (2-6). Credit 4. II**

Solution of problems involved in design and development of chemical engineering plants. Interrelation of fundamentals covered in courses is demonstrated. Prerequisite: Ch.E. 424.

**428. Industrial Chemical Processes. (3-0). Credit 3. II**

Study of representative chemical manufacturing processes and their relationships. Prerequisite: Ch.E. 424.

**429. Oil and Gas Technology Laboratory. (0-3). Credit 1. I**

Laboratory work to accompany Ch.E. 409.

**433. Unit Operations Laboratory. (0-3). Credit 1. I**

Laboratory work based on Ch.E. 423. Prerequisite: Ch.E. 314.

**454. Chemical Engineering Thermodynamics. (3-0). Credit 3. I**

Study of applications of thermodynamics to chemical engineering processes and operations. Prerequisites: Chem. 324; Ch.E. 423.

**461. Process Control and Instrumentation. (2-0). Credit 2. I**

Study of fundamental principles and methods used in measurement and control of process variables such as pressure, temperature, and flow rate. Prerequisite: Ch.E. 423.

**464. Chemical Engineering Kinetics. (3-0). Credit 3. II**

Introduction to kinetics of reactions and application of fundamental principles to design and operation of commercial reactors. Prerequisites: Ch.E. 424, 454.

**481. Seminar. (1-0). Credit 1. I**

Oral discussion of selected topics from recent technical publications. Prerequisite: Senior classification.

**485. Advanced Problems in Chemical Engineering. Credit 1 to 5. I, II**

Work covers one or more of numerous problems in chemical engineering processes or operations. Prerequisites: Ch.E. 423; approval of Department Head.

### FOR GRADUATES

**605. Chemical Engineering Economics. (3-0). Credit 3. I**

Advanced calculations involving process design and process control as limited by least cost or maximum profit. Problems based on various unit operations and unit processes. Prerequisite: Ch.E. 423.

**606. Unit Operations. (3-0). Credit 3. II**

Applications of chemical engineering fundamentals in manufacture of chemicals, refining petroleum, and other allied industries. Prerequisite: Ch.E. 423.

**608. Heat Transmission. (3-0). Credit 3. I**

Process and process design calculations on equipment involving transfer of heat by conduction, convection, and radiation. Prerequisite: Ch.E. 423.

**612. Distillation. (3-0). Credit 3. I**

Process and process design calculations involving distillation of multi-component and complex systems. Extractive and azeotropic distillation are covered. Prerequisite: Ch.E. 423.

**619. Corrosion and Materials of Construction. (3-0). Credit 3. I**

Uses of materials of construction to preclude high corrosion rates in process equipment. Prerequisite: Ch.E. 423.

**623. Applications of Thermodynamics to Chemical Engineering. (3-0). Credit 3. II**

Study of applications of thermodynamics to chemical engineering operations and processes. Prerequisite: Ch.E. 454.

**624. Chemical Engineering Kinetics I. (3-0). Credit 3. I**

Study of rates and mechanisms of chemical reactions. Thermal and catalytic reactions both homogeneous and heterogeneous are considered. Prerequisite: Ch.E. 423.

**625. Chemical Engineering Kinetics II. (3-0). Credit 3. II**

Study of physical factors affecting chemical reaction rates and of methods for design of reaction equipment. Prerequisite: Ch.E. 624.

**626. Oil and Fat Technology. (3-0). Credit 3. I**

Study of composition and properties of oils and fats, methods of extraction and purification, and their industrial utilization. Prerequisites: Ch.E. 423; Chem. 228.

**627. Oil Mill Operation. (2-6). Credit 4. I**

Study of theoretical and practical operating characteristics of various units used in vegetable oil production. Economic factors of each unit and their over-all effect on plant operation. Prerequisite: Ch.E. 626 or registration therein.

**629. Transport Phenomena. (3-0). Credit 3. I**

Principles of transfer of momentum, energy, and mass studied by application to advanced chemical engineering problems. Theoretical analogy of these three modes of transfer will be emphasized. Prerequisite: Ch.E. 454.

**631. Process Dynamics I. (3-0). Credit 3. I**

Study of dynamics, simulation and control of linear models of fluid, thermal, and mass transfer processes for chemical industries by means of transient and frequency response analysis and design methods. Prerequisites: Ch.E. 461; Math. 601; or registration therein.

**632. Process Dynamics II. (3-0). Credit 3. II**

Continuation of Ch.E. 631. Theory and application of discrete, non-linear, and stochastic dynamic analysis and optimal design policies to processes in chemical and allied fields. Prerequisite: Ch.E. 631.

**681. Seminar. (1-0). No credit. I, II**

Graduate students will be required to attend one hour per week to discuss problems of current importance in connection with their research.

**685. Problems. Credit 1 to 6. I, II, S**

The work covers one or more of numerous problems in chemical engineering processes and operations. Prerequisite: Approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Problems of unit operations and unit processes. For maximum credit comprehensive thesis must be prepared of sufficiently high calibre to permit publication in scientific and technical journals. Prerequisite: Approval of Department Head.

## Department of Chemistry

Professors Calaway, Duke, Gladden, Hancock, Hood, Isbell, Suttle, Traxler, Whealy, Zingaro, Zwolinski (Head); Associate Professors Alexander, Beckham, Conway, Danti, Hedges, Lee, Meyers, Page, Rakoff, Rose, Sicilio, Wilhoit; Assistant Professors Jones, Kust, Menon; Instructors Simpson, Spurlock

**101. General Chemistry. (3-3). Credit 4. I, II, S**

Fundamental laws and theories of chemical activity. Practical applications of chemical processes involving non-metals are briefly described. Laboratory work deals with non-metals and simple tests of technical importance.

**102. General Chemistry. (3-3). Credit 4. I, II, S**

Fundamental theories of structure and activity. Practical application of chemical processes involving metals described. Organic chemistry is outlined. Laboratory work

consists of qualitative separation and identification of metallic and non-metallic ions. Prerequisite: Chem. 101.

**103. Chemical Principles. (3-3). Credit 4. I**

Chemical principles and their application. For student of superior aptitude and interest. Laboratory work provides opportunity for individual experimentation. Prerequisite: For entering students with high scores on algebra and chemistry placement examinations.

**104. Chemical Principles. (3-3). Credit 4. II**

Continuation of Chem. 103. Laboratory work consists mainly of semi-micro qualitative analysis with ample opportunity for individual experimentation. Prerequisite: Chem. 103.

**106. General Chemistry. (3-3). Credit 4. II**

Survey course in chemistry for students needing it as cultural subject and not as basis for advanced work.

**223. Elementary Quantitative Analysis. (2-3). Credit 3. I, II, S**

Basic principles and theories of quantitative analysis, both gravimetric and volumetric. Treatment not highly mathematical. Laboratory work designed to illustrate basic techniques. Not open to engineering students. Prerequisite: Chem. 102 or 104.

**226. Chemical Calculations. (2-0). Credit 2. I**

Advanced review of chemical calculations of general chemistry with special emphasis on stoichiometry and chemical equilibrium. Prerequisite: Chem. 102 or 104.

**227. Organic Chemistry. (3-3). Credit 4. I, II, S**

Introduction to chemistry of compounds of carbon. Study of general principles and their application to various industrial and biological processes. Laboratory work serves as basis of course. Prerequisite: Chem. 102 or 104.

**228. Organic Chemistry. (3-3). Credit 4. I, II, S**

Continuation of Chem. 227. Prerequisite: Chem. 227.

**231. Elementary Organic Chemistry. (3-0). Credit 3. I, II, S**

Study of aliphatic series of organic compounds including introduction to benzene series and to vitamins, proteins, and related substances. Applications taken from field of agriculture. Not open to engineering students. Prerequisite: Chem. 102 or 104.

**232. Elementary Organic Chemistry. (4-3). Credit 5. I, II, S**

Study of hydrocarbons and their derivatives. Applications taken from field of agriculture, including introduction to proteins, carbohydrates, fats, vitamins, and related products. Laboratory designed to familiarize student with preparation, properties, and relations of typical organic compounds. Prerequisite: Chem. 102 or 104.

**316. Quantitative Analysis. (2-0). Credit 2. I, II, S**

Introduction to methods of chemical analysis. Special attention given to chemical equilibrium. Prerequisite: Chem. 102 or 104.

**317. Quantitative Analysis. (2-0). Credit 2. II**

Introduction to theory and practice of optical and electrical methods of analysis. Prerequisite: Chem. 316.

**318. Quantitative Analysis Laboratory. (0-3). Credit 1. I, II, S**

Laboratory work consists of selected experiments in quantitative analysis designed to typify operations of general application. Work is primarily volumetric with limited gravimetric experiments. Prerequisite: Chem. 316 or registration therein.

**319. Quantitative Analysis Laboratory. (0-6). Credit 2. I, II, S**

Laboratory work consists of selected experiments in quantitative analysis designed to typify operations of general application. Work is primarily volumetric with limited gravimetric experiments. Prerequisite: Chem. 316 or registration therein.

**320. Instrumental Analysis Laboratory. (0-6). Credit 2. II**

Introduction to use of electrical and optical measurements in chemical analysis. Prerequisite: Chem. 317 or registration therein.



**323. Physical Chemistry. (3-0). Credit 3. I, II**

Explanation and mathematical development of theories and principles of chemistry. Gas laws, thermodynamics, thermochemistry, liquids, solutions. Prerequisite: Chem. 316; Math. 122 or 210.

**324. Physical Chemistry. (3-0). Credit 3. II, S**

Intensive study of homogeneous and heterogeneous equilibria, phase rule, chemical kinetics, catalysis, hydrogen-ion concentration, electrolytic and galvanic cells and electrochemistry, photochemistry, and radioactivity. Prerequisite: Chem. 323.

**325. Physical Chemistry Laboratory. (0-3). Credit 1. I, II**

Experiments substantiate theories and principles developed in theory course, Chem. 323. Prerequisite: Chem. 323 or registration therein.

**326. Physical Chemistry Laboratory. (0-3). Credit 1. II, S**

Experiments substantiate theories and principles developed in theory course, Chem. 324. Prerequisite: Chem. 324 or registration therein.

**342. Physical Chemistry. (3-3). Credit 4. II**

Explanation of basic chemical theories and principles with reference to their relationship to transformations in living matter. Prerequisites: Chem. 227, 316.

**380. Chemical Bibliography. (1-0). Credit 1. II**

Study of chemical library with instruction in use of chemical journals, reference books, and other sources of information. Prerequisite: Junior classification.

**447. Qualitative Organic Analysis. (2-6). Credit 4. I**

Identification of principal classes of organic compounds. Prerequisite: Chem. 228.

**461. Physical Chemistry. (3-0). Credit 3. I**

Topics in undergraduate physical chemistry not covered in Chem. 323 and 324. Atomic structure, molecular structure and properties. Prerequisite: Chem. 324.

**462. Inorganic Chemistry. (3-0). Credit 3. I**

Periodic relationship of elements, their compounds, principles of their bonding and applications. Prerequisite: Chem. 324.

**463. Inorganic Chemistry. (2-3). Credit 3. II**

Continuation of Chem. 462. Laboratory work consists of preparation and analysis of inorganic compounds designed to introduce student to basic preparative techniques. Prerequisite: Chem. 462 or approval of instructor.

**464. Nuclear and Radiochemistry. (2-3). Credit 3. II**

Chemical aspects associated with production and application of nuclear energy; principles of separations and utilization of radioactivity and radiation. Less extensive than Chem. 661. Prerequisites: Chem. 317, 324 or approval of instructor.

**481. Seminar. (1-0). Credit 1. II**

Oral discussion of selected topics from technical publications.

**485. Problems. Credit 1 to 4. I, II, S**

Introduction to research, library, and laboratory work. Prerequisites: Senior classification; approval of Department Head.

### FOR GRADUATES

**600. Survey of Chemistry. (2-3). Credit 3. I**

Survey course designed for teachers of high school chemistry. Prerequisites: Graduate classification; approval of Heads of Departments of Chemistry and of Education and Psychology.

**607. Organic Techniques and Preparations. (1-6). Credit 3. II**

Study of laboratory operations theory and description and comparison of equipment used in advanced work. Application of techniques of organic chemistry in laboratory. Prerequisite: Chem. 646 or registration therein.

**608. Qualitative Organic Analysis. (1-6). Credit 3. I**

Analysis of organic compounds. Prerequisite: Chem. 228.

**609. Theory of Organic Chemistry. (3-0). Credit 3. II**

Development and application of chemical theories to organic compounds. Prerequisite: Chem. 646.

**610. Organic Reactions. (3-0). Credit 3. II**

Relatively detailed study of organic reactions, not only those commonly described in undergraduate course but also the less well known but equally useful reactions. Advantages and limitations of these reactions in organic syntheses. Prerequisites: Chem. 609, 646 or their equivalent.

**611. Principles of Physical Chemistry. (3-0). Credit 3. I**

Study of general principles of chemistry from quantitative standpoint. Discussion of gases, liquids, and solutions. Prerequisite: Graduate classification.

**620. Principles of Chemical Analysis. (3-0). Credit 3. II**

Advanced survey of principles of chemical analysis with special emphasis on newer developments in field of analytical chemistry. Prerequisite: Chem. 317.

**621. Chemical Kinetics. (3-0). Credit 3. I**

Study of some of present theories about chemical reaction rates and mechanisms. Prerequisite: Chem. 324.

**624. Physico-Organic Chemistry. (3-0). Credit 3. II**

Mathematical and quantitative investigation of organic chemical phenomena. Prerequisite: Chem. 609 or approval of instructor.

**625. Petroleum Chemistry. (3-0). Credit 3. II**

Practical and theoretical consideration of chemical reactions of petroleum hydrocarbons. Prerequisites: Chem. 228, 324. (Offered in 1965-66 and in alternate years thereafter.)

**626. Thermodynamics. (3-0). Credit 3. I**

Theory and applications of classical thermodynamic functions. Prerequisite: Chem. 324.

**627. Diffraction Methods. (3-0). Credit 3. II**

Introduction to use of diffraction methods for determination of molecular structure. Major emphasis placed on results of diffraction of X-rays by crystals but related methods are also discussed. Prerequisites: Chem. 324; Math. 601 or equivalent; approval of instructor.

**628. The Non-Metallic Elements. (3-0). Credit 3. I**

Study of non-metals and their compounds. Recent developments. Knowledge of German or French desirable. Prerequisite: Chem. 324.

**630. The Metallic Elements. (3-0). Credit 3. I**

Study of metals and their compounds. Recent developments. Knowledge of German or French desirable. Prerequisite: Chem. 324.

**631. Statistical Thermodynamics. (3-0). Credit 3. II**

Introduction to methods of statistical mechanics based primarily on Boltzmann statistics. Approach to thermodynamics through partition function. Statistical concept of entropy. Prerequisite: Chem. 626.

**635. Heterocyclic Compounds. (3-0). Credit 3. I**

Structure, preparation, and properties of heterocyclic compounds with special emphasis on those with biological activity. Prerequisite: Chem. 228. (Offered in 1964-65 and in alternate years thereafter.)

**636. Electrochemistry. (3-0). Credit 3. I**

Advanced treatment of conductivity, electrochemical, thermodynamics, galvanic cells, electrodeposition, and corrosion. Prerequisite: Chem. 324.

**639. Instrumental Methods of Analysis. (2-3). Credit 3. I**

Study of theory and practice of modern techniques of chemical analysis. Laboratory work illustrates use of these instruments for routine analytical work and as research tools. Prerequisite: Chem. 317.

**641. Structural Inorganic Chemistry. (3-0). Credit 3. I**

Study of nuclear and extranuclear structure, isotopes, valency of elements, and stereochemistry of inorganic compounds. Prerequisite: Chem. 462.

**642. Methods of Structural Chemistry. (3-0). Credit 3. II**

Study of theory, methods, and application of structural determination (arrangement and bonding) of chemical species. Prerequisite: Chem. 641 or approval of instructor. (Offered in 1964-65 and in alternate years thereafter.)

**643. Inorganic Complex Compounds. (3-0). Credit 3. II**

History, theories, and methods of investigations of inorganic complex compounds. Prerequisite: Chem. 462. (Offered in 1965-66 and in alternate years thereafter.)

**644. Quantitative Organic Analysis. (1-6). Credit 3. I**

Determinations: Macro Dumas, sulfur, Carius halogen, Micro residue, fractionation, Micro Dumas, catalytic hydrogenation, carbon and hydrogen, Micro Kjeldahl, Rast molecular weight, molar refraction, active hydrogen, alkaxyl, semi-micro saponification number. Prerequisites: Chem. 228; reading knowledge of German.

**646. Organic Chemistry. (3-0). Credit 3. I**

Systematic and thorough presentation of organic chemistry on advanced level. Prerequisite: Chem. 228.

**648. Principles of Quantum Mechanics. (3-0). Credit 3. I**

Brief review of classical mechanics and development of wave mechanics. Application of wave mechanics to special chemical problems. Prerequisite: Approval of instructor.

**649. Molecular Quantum Mechanics. (3-0). Credit 3. II**

Continuation of Chem. 648. Introduction to group theoretical methods and applications in molecular quantum mechanics and elements of ligand field theory. Prerequisite: Chem. 648.

**650. Molecular Spectra and Structure. (3-0). Credit 3. II**

Introduction to molecular spectroscopy and its relations to structure, theoretical treatments, quantum and wave mechanics, vibrations and normal coordinates, molecular symmetry, and group theory. Prerequisite: Qualifying graduate students in chemistry and physics, or approval of instructor.

**661. Radiochemistry. (2-3). Credit 3. II**

General course dealing with radioactive materials; their radiations; their preparation, purification, detection, identification, and their practical applications. Material on nuclear structures, nuclear transmutations, and radioactivity. Prerequisite: Chem. 324.

**685. Problems. Credit 1 to 6. I, II, S**

Special topics to suit small group requirements. More recent problems and results in various branches of chemistry. Laboratory work or conference and discussion. Prerequisite: Graduate classification.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis or dissertation.

## Department of Civil Engineering

Professors Baty, Benson, Buchanan, Foster, Furr, Gallaway, Harrington, Holcomb, Keese, Orr, Samson (Head), Scrivner, Smerdon, Sorrels, Traxler, Wright; Associate Professors Hirsch, Jimenez, McCasland, Pinnell, Schiller, Smith; Assistant Professors Armstrong, Davis, Drew, Dunlap, Ivey, Ledbetter, Lowery, Olson, Rowan, Sweet, Wattleworth, Tidwell

**201. Plane Surveying. (3-3). Credit 4. I, II**

Measurement of distances; use and care of surveying equipment; measurement of angles; land surveys and computations; stadia and plane table surveys; route surveys; horizontal and vertical curves; earthwork computations. Prerequisite: Math. 103.

**206. Plane Surveying. (0-3). Credit 1. I, II**

Fundamental principles of surveying; use of transit and level; boundary surveys, area computations, profile surveys. Prerequisite: Math. 103.



**208. Topographic Surveying. (1-3). Credit 2. I, II**

Fundamental principles of surveying; use of transit and level; special emphasis placed on use of plane table in topographic mapping. Prerequisite: Math. 103.

**300. Summer Surveying Practice. Credit 5. S**

Six weeks of surveying practice. Horizontal and vertical control; base line measurements; transit-stadia surveys; plane table surveys; boundary surveys; area and coordinate computation; polaris and solar observations; route surveys. Stream gauging. Prerequisite: C.E. 201.

**301. Water and Sewage Treatment. (2-2). Credit 3. I, II, S**

Principles and methods of water purification and sewage treatment and disposal; laboratory demonstrations of control tests and correlation of results with treatment plant operation; interpretation of reports; inspections of local plants. Prerequisites: Chem. 102 or 104; C.E. 311.

**305. Mechanics of Materials. (3-0). Credit 3. I, II, S**

Axial stresses and strains; stresses on various planes; properties of materials; stresses in thin-walled cylinders; torsional and flexural stresses and strains; shear and moment diagrams; equation of elastic curve; moment area theorems; combined loadings; column behavior. Prerequisites: Math. 122 or 210; M.E. 212 or equivalent.

**306. Mechanics of Materials. (2-0). Credit 2. I, II, S**

Stresses and strains at a point including both analytical and graphical methods, theories of failures, fundamentals of riveted and welded joints, unsymmetrical bending, thick-walled cylinders, curved beams in flexure. Prerequisite: C.E. 305.

**307. Highway Engineering. (3-0). Credit 3. I, II, S**

Location, design, drainage, construction, and maintenance of highways, streets, and pavements. Road laws, finances, highway organizations and supervision briefly considered. Prerequisites: C.E. 300, 338, 365 or registration therein.

**311. Hydraulics. (3-0). Credit 3. I, II**

Laws governing action of water at rest and in motion, flow of water in pressure mains, sewers, aqueducts, open channels, and rivers; measurement of flow of water by nozzle, orifices, weirs, and meters; flow of viscous fluids. Prerequisite: M.E. 212 or equivalent.

**315. Strength of Materials Laboratory. (0-2). Credit 1. I, II**

Determination of strength, ductility, modulus of elasticity, and other properties of engineering materials. Tests of timber, steel, cast iron, and concrete. Prerequisite: C.E. 305 or registration therein.

**336. Hydraulics Laboratory. (0-2). Credit 1. I, II**

Calibration of nozzles, orifices, water meters, weirs, pressure gauges; measurement of pipe friction; measurement of pipe flow; efficiency tests on impulse motor, hydraulic ram, and centrifugal pump. Prerequisite: C.E. 311 or registration therein.

**338. Hydraulics of Drainage Structures. (2-0). Credit 2. I, II**

Elementary study of rainfall and run-off and hydraulics of culverts and drainage structures; flow in open channels. Prerequisite: C.E. 311.

**345. Theory of Structures. (3-0). Credit 3. I, II, S**

Introduction to structural engineering; loads, reactions, and force systems; reactions and forces in beams, three-hinged arches, and trussed structures; moment area method applications, moment distribution method of analyzing statically indeterminate structures, forces, and reactions in bents and portals; influence lines and criteria for moving loads. Prerequisite: C.E. 306 or registration therein.

**346. Design of Members and Connections. (2-3). Credit 3. I, II, S**

Design of tension members, compression members, beams, riveted joints and welded joints. Theory and practice as indicated in typical current specifications. Prerequisite: C.E. 345.

**348. Engineering Economy. (2-0). Credit 2. I, II**

Analysis of operating costs of engineering projects including interest, depreciation, fixed costs, overhead. Comparison of first cost economy versus ultimate economy. Prerequisite: Junior classification in engineering.

**350. Design of Formwork and Falsework. (2-0). Credit 2. II**

Design of wood beams, columns, tension members, and connections. Design of formwork and falsework for conventional and special concrete structures using all conventional material. Formwork detailing and construction procedures. Prerequisite: C.E. 345.

**351. Construction Engineering Summer Practice. Twelve weeks; required no credit. S**

Summer practice with general contractor engaged in building, highway, heavy or other important construction. Minimum of 6 weeks work in constructions in field, preferably apprenticeship in basic trade or work associated with heavy equipment operation or maintenance. Minimum of 6 weeks in contractor's office or time and cost keeping or survey party experience in field.

**365. Soil Mechanics and Foundations. (2-2). Credit 3. I, II, S**

Introduction to soil mechanics and its application in civil and architectural engineering; origin, formation processes, and types of soils. Methods of exploration and soil testing required for design of various types of foundations, retaining walls, and other engineering structures. Prerequisites: C.E. 305; Geol. 320 or 422.

**402. Water Supply and Sewerage Practice. (2-2). Credit 3. I, II**

Development of sources of water supply; determination of quantity of storm water and domestic sewage; water supply distribution systems, sewer systems, and general features of water purification and sewage treatment plants; appurtenances and treatment plant equipment. Prerequisites: C.E. 301, 338.

**403. Sanitary Design. (2-3). Credit 3. II**

Practical problems in design of sewer systems and appurtenances; sewage treatment plant; water collection and distribution systems; water purification plants. Prerequisite: C.E. 402 or registration therein.

**406. Sanitation and Public Health. (3-0). Credit 3. I**

Sanitation and public health; residential water supply and excreta disposal methods; municipal sanitary work, plumbing; control of food supplies; mosquito, fly, and rodent control; sanitation of swimming pools; industrial hygiene; organization of health departments. Prerequisite: Junior classification.

**408. Municipal Administration. (3-0). Credit 3. I**

City government, including city manager plan; relation of city to state; administration of city departments; public utilities; city planning. Prerequisite: Junior classification.

**417. Bituminous Materials. (2-3). Credit 3. II**

Origin, production, specifications, and tests of bituminous materials and mixtures used in construction and maintenance of roads and pavements. Prerequisites: Senior classification in engineering; C.E. 307 or registration therein.

**435. Soil Engineering. (2-3). Credit 3. I**

Design and construction of earth dams and coffer dams; design of footings, drilled piers, and pile substructures; design and construction of embankments and subgrades for roads and airfields; seepage through earth masses. Prerequisites: C.E. 365; senior classification.

**443. Materials of Construction. (2-3). Credit 3. I, II**

Laboratory tests, supplemented with theory of portland cement, coarse and fine aggregates, concrete mixture design, air entrained and lightweight aggregate concrete. Prerequisite: Senior classification.

**444. Reinforced Concrete Structures. (3-3). Credit 4. I, II, S**

Analysis and design of reinforced concrete beams, columns, slabs, and footings using elastic and ultimate strength methods. Prerequisite: C.E. 345.

**456. Highway Design. (2-3). Credit 3. II**

Theory and practice in highway design. Highway classification and design criteria, location studies, design of vertical and horizontal alignments, cross section, pavement, intersections and highway drainage elements. Prerequisite: C.E. 307.

**457. Traffic Engineering. (3-0). Credit 3. I**

Study of vehicle operating characteristics, traffic flow, geometric design of roads,

streets, and intersections, and methods of traffic control. Prerequisites: C.E. 201, 301 or registration therein; Phys. 219.

**458. Hydraulic Engineering. (3-0). Credit 3. II**

Flow in pipes and complex pipe systems; non-uniform flow in open channels; pumping machinery; elementary hydraulic model theory. Prerequisite: C.E. 338.

**463. Hydrology. (3-0). Credit 3. I**

Study of occurrences and measurements of precipitation and stream flow, relations between precipitation and run-off; estimating seepage; evaporation, run-off; surface, and flood discharges for drainage basins. Prerequisite: C.E. 311.

**470. Aerial Photogrammetry. (2-3). Credit 3. II**

Study of photogrammetric optics, characteristics of aerial photographs, aerial cameras, map projections, ground control, radial plots, mosaics, interpretation of aerial photographs, stereoscopic plotting instruments, and mapping from oblique photographs. Prerequisite: C.E. 201.

**473. Cost Estimating. (3-0). Credit 3. I, II, S**

Approximate and detailed estimates of cost of construction projects including earthwork, foundations, concrete, masonry, steel, and miscellaneous items. Costs are developed to include materials, equipment, labor, overhead, and profit. Prerequisite: Senior classification.

**478. Construction Plant and Methods. (3-0). Credit 3. I, II**

Plant and equipment selection for earthwork, foundations, concrete and structural steel, based on performance and economy. Construction schedules, progress reports, and performance records. Prerequisite: Senior classification in engineering or architecture.

**481. Seminar. (1-0). Credit 1. I, II**

Methods of job procurement subsequent to graduation; responsibilities and obligations of young civil engineer; professional ethics; membership in professional societies, professional registration; lectures by staff and practicing engineers. Prerequisite: Senior classification.

**483. Analysis and Design of Structures. (2-3). Credit 3. I, II**

Over-all procedure of analysis and design, including functions, loads, layouts of force systems, analysis, design drafting, specifications, cost comparisons, and maintenance as applied to typical simple bridge and building structures. Prerequisites: C.E. 346, 365, 444.

**485. Problems. Credit 1 to 3. I, II, S**

Research and design problems of limited scope approved on an individual basis intended to promote independent study. Results of study presented in writing. Prerequisite: Approval of Department Head.

**486. Design of Prestressed Concrete Structures. (2-3). Credit 3. II**

Basic theory; prestressing systems; design of determinate beams for flexure, shear, bond, and bearing. Deflections. Design of slabs and of continuous beams. Circular prestressing. Tension and compression members. Connections. Prerequisite: C.E. 483.

**488. Construction Equipment. (2-0). Credit 2. II**

Equipment operating characteristics, maintenance procedures and scheduling. Work capability, planning, scheduling, and control. Highway and heavy construction equipment and major equipment used in building construction. Prerequisite: C.E. 478.

**490. Construction Planning. (2-3). Credit 3. II**

Planning, scheduling, and control of complete job operations. Case studies in building construction, highways, and heavy construction. Traditional and computer methods of job scheduling and management including critical path techniques. Prerequisites: C.E. 473, 478.

(See S.M. 468, 469 for descriptions of related courses.)



## FOR GRADUATES

**601, 602. City Management. (4-0). Credit 4 each semester. I, II**

Development of European and American cities; forms of city government; functions of city manager; administration of municipal affairs; organization of city departments; city finances; public utilities, fire prevention and protection, police administration; parks and playgrounds.

**603. Sewage Treatment and Stream Sanitation. (4-0). Credit 4. I**

Processes of sewage treatment and requirements regarding quality of sewage treatment plant effluents in relation to sanitary protection of receiving waters. Prerequisite: C.E. 402.

**604. Water Quality and Treatment. (4-0). Credit 4. II**

Characteristics of available sources of water, standards of quality of public water supplies, and theories of treatment and purification processes, with special attention given to details of methods and units employed to effect these processes. Prerequisite: C.E. 402.

**607, 608. Environmental Sanitation. (4-0). Credit 4 each semester. I, II**

Environment and its relation to disease; rodent control; sanitation of milk, shellfish, and other foods; collection and disposal of municipal refuse; sanitary aspects of air conditioning; housing sanitation; rural water supply and excreta disposal; sanitary inspection procedure.

**610. Industrial Wastes. (4-0). Credit 4. II**

Amount and characteristics of common industrial wastes; their effects upon sewage treatment; methods of treatment. Prerequisite: C.E. 301 or equivalent.

**612. Transportation in City Planning. (2-0). Credit 2. I, S**

Importance of transportation in urban development and planning. Role of engineer in planning. Relationship of transportation to planning studies, land use, zoning, planning legislation, and administration. Prerequisite: Graduate classification in College of Engineering.

**615. Structural Design of Flexible Pavements. (2-0). Credit 2. I**

Characteristics of pavement loads, stress analysis in flexible pavements, design practices, construction and maintenance. Prerequisite: C.E. 307.

**617. Traffic Engineering: Characteristics. (2-3). Credit 3. I**

Advanced theory and practice of engineering studies of traffic characteristics. Methods of traffic administration. Prerequisite: C.E. 457.

**618. Traffic Engineering: Operations. (2-3). Credit 3. II**

Advanced theory and application of traffic control and design of traffic facilities. Traffic regulations. Prerequisite: C.E. 617.

**619. Highway Problems Analysis. (2-3). Credit 3. II**

Advanced techniques in statistics, aerial photogrammetry, and data processing in solution of problems in highway and traffic design and research. Students should have knowledge of computer programming and basic statistics. Prerequisites: C.E. 617; I.En. 414.

**620. Structural Design of Rigid Pavements. (2-0). Credit 2. II**

Theory of rigid pavement design, design practices, maintenance, and construction. Prerequisite: C.E. 307.

**621. Advanced Reinforced Concrete Design. (3-3). Credit 4. I**

Flat slabs, continuous building frames, torsion, deep beams, bulk storage structures, creep and temperature change effects. Prerequisite: C.E. 444.

**622. Hydraulics of Drainage Structures. (2-3). Credit 3. II**

Hydraulics of open channels, bridge openings, culverts, head walls, surface street drainage, storm sewers, gutters, drop inlets and spillways. Theory of model studies as applied to drainage of highways, streets, and freeways. Prerequisite: C.E. 338 or equivalent.

**625. Geometric Design of Highways. (2-3). Credit 3. I**

Advanced theory and practice in highway design. Design controls and criteria,

elements of design, design of alignment, cross-section, intersections and interchanges, multilane expressways, and drainage structures. Prerequisites: C.E. 307, 365.

**627. Hydrology. (3-3). Credit 4. I**

Precipitation, stream gaging methods, evaporation and transpiration, groundwater, hydrograph analysis, flood hydrographs from rainfall and snow, snow melt. Stream flow routing, frequency and duration. Studies, sedimentation, storage reservoir design, graphical correlation, airfield drainage.

**628. Hydraulic Engineering. (3-3). Credit 4. II**

Boundary layer theory, fluid flow in pipes, complex pipe networks, dimensional analysis, similitude and models, gradually and rapidly varied flow in open channels, backwater curves in natural streams, stilling basin design problems.

**629. Hydraulics of Open Channels. (3-3). Credit 4. I**

Advanced problems in uniform and non-uniform flow in open channels; hydraulic jump; control section; backwater profiles.

**632. Advanced Design in Metals. (2-3). Credit 3. II**

Properties of high-strength and other special materials. Stress concentrations and fatigue. Design of complex members and connections such as: curved columns, fixed bases, and rigid-frame knees. Prerequisites: C.E. 483; S.M. 468.

**633. Advanced Mechanics of Materials. (4-0). Credit 4. II, S**

Stresses and strains at a point, torsion of non-circular cross sections, beams with combined axial and lateral loads, built-up columns, lateral buckling of beams, torsional buckling of centrally loaded columns, bending of thin plates and shells. Prerequisites: Aero. 306 or C.E. 306; Math. 308.

**634. Airfield Planning and Design. (2-0). Credit 2. II**

Regional planning, air traffic routing, landing requirements, methods for development of master plans for site selection, airfield design requirements involving layouts, pavement selection, and design. Review and application of criteria of design of drainage for all types of fields.

**636. City Street Design. (2-0). Credit 2. S**

Street classification and function. Design of city streets, intersections, access drives, and pavements. Street drainage. Financing city street improvements. Prerequisite: C.E. 307.

**640. Freeway Design and Operation. (2-0). Credit 2. S**

Characteristics of traffic flow on controlled access facilities. Advanced theory and practice in operation on freeways and related street systems. Freeway traffic control. Material based on advanced research of Texas Transportation Institute. Prerequisite: C.E. 618.

**643. Plastic Analysis and Design in Steel. (2-3). Credit 3. I, S**

Principles and methods that are basis for plastic analysis and design. Static and mechanism methods of analysis of structures. Influence of shear and axial forces on plastic design. Effect of lateral buckling. Design of connections to provide plastic action. Prerequisite: Graduate classification in civil engineering or approval of instructor.

**649. Soil Mechanics. (3-3). Credit 4. I**

Study of foundation materials as they exist and of various types of soils, their physical properties, testing procedure, and principles of classification. Prerequisites: C.E. 365; Geol. 320.

**650. Soil Mechanics. (3-3). Credit 4. II**

Foundation exploration, laboratory investigations of undisturbed foundation samples, stress distribution through soils; foundation design, correlation of settlement data from actual observations, stability of embankments, backfill pressures. Prerequisite: C.E. 649.

**651. Advanced Theory and Application of Soil Mechanics. (3-3). Credit 4. I**

Special lectures, discussions and applications of theory to solution of major problems encountered in practice of soil engineering, embracing the fields of seepage, earth work design, foundation design, port structures, and special problems. Prerequisite: C.E. 650.

**653. Flexible Materials of Construction. (2-3). Credit 3. I**

Theory supplemented with laboratory tests of bitumen, tars, and plastics. Stabilization of base and subgrade materials. Advanced mix design and evaluation of test methods; rheology and chemistry of asphalt. Prerequisite: C.E. 417.

**654. Rigid Materials of Construction. (2-3). Credit 3. II**

Physical and chemical properties of rigid materials of construction; laboratory tests of different kinds of concrete, tests of metals and laminates; theory of corrosion of ferrous metal; corrosion mitigation; shrinkage and plastic flow of stressed concrete; design of concrete mixtures. Prerequisite: C.E. 443.

**656. Concrete Structures Testing Laboratory. (1-3). Credit 2. II**

Methods and equipment used in testing reinforced concrete structures and elements of structures. Observations of behavior in compression, flexure, shear, torsion, and combinations thereof. Correlations with theory, both elastic and plastic. Prerequisite: C.E. 621.

**657. Dynamic Loads and Structural Behavior. (3-3). Credit 4. I**

Forces resulting from wind, other moving fluids, earthquake, blasts impact, moving loads, and machinery. Dynamic behavior of various structures and structural elements under action of such loads. Self-induced vibration. Prerequisites: C.E. 483; M.E. 459; S.M. 468.

**659. Structural Design. (3-3). Credit 4. II**

General theory and design procedures for thin-shell and folded-plate structures. Characteristics, use, construction, problems, and economic factors. Membrane theory for shells. Edge effects and effects of unsymmetrical loading. Prerequisite: S.M. 469 or equivalent.

**664. Water Resources Development. (3-0). Credit 3. II**

Conservation and utilization of water resources with emphasis on legal, social, and economic phases of watershed planning and multi-purpose projects. Prerequisites: Graduate classification; approval of Department Head.

**666. Foundation Structures. (2-3). Credit 3. II**

Spread footings, combined footings, and raft foundations. Retaining walls, piles, and pile foundations. Sheet-pile structures, cofferdams, wharves, and piers. Bridge piers and abutments. Prerequisites: C.E. 365 or equivalent; graduate classification in civil engineering.

**667. Highway Structures. (3-3). Credit 4. I**

Structural analysis and design of bridges, grade separation structures, retaining walls, and culverts. Loads, materials, comparisons of different types, and economic proportions. Current standards, new developments, and current cost information. Prerequisites: C.E. 483, 625.

**669. Bituminous Technology. (2-0). Credit 2. I, II**

Methods and techniques used in evaluating chemical, physical, colloidal and rheological properties of asphaltic materials. Available data will be discussed and a study made of methods for evaluating durability of asphalt. Prerequisite: C.E. 417.

**670. Bituminous Technology. (2-0). Credit 2. I, II**

Procedures used in selecting and processing crude oil for manufacture of asphalt; fundamental properties of asphaltic cutbacks, asphalt emulsions and mineral filled bitumens. Requirements of asphalts for use in roads, roofing and special applications. Prerequisite: C.E. 669.

**671. Urban Transportation Planning. (2-0). Credit 2. S**

Urban transportation problem. Techniques of estimating demand for traffic facilities. Special studies required in transportation planning. Prerequisite: C.E. 617.

**672. Urban Transportation Planning. (2-0). Credit 2. S**

Problems of mass transportation. Study of central business district, suburban shopping centers and terminal planning. Street and subdivision transportation system planning. Urban transportation economics, financing, and administration. Prerequisite: C.E. 671.



**681. Seminar. (0-2). Credit 1. I, II, S**

Reports and discussion of current research and of selected published technical articles. May not be taken for credit more than once in Master's degree program and twice in Ph.D. program. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 6 each semester. I, II, S**

Enables majors in civil engineering to undertake and complete with credit in their particular fields of specialization limited investigations not within their thesis research and not covered by other courses in established curriculum.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis or dissertation.

(See S.M. 601, 602, 603, 604, 605, 606, 607, 608, 609 for descriptions of related courses.)

## **Department of Dairy Science**

Professors Leighton, Moore, Peters, Rupel (Head), Vanderzant; Associate Professor Brown

**202. Dairying. (2-2). Credit 3. I, II**

Survey of dairy industry; dairy breeds, standards for selection and culling, herd replacements, feeding, management, and health maintenance. Food value of milk, tests for composition and quality, utilization and processing of market milk and dairy products. Prerequisite: Chem. 101 or 103.

**301. Market Milk. (3-2). Credit 4. I**

Nutritional value of milk; milk and public health; organization of city milk supplies; processing, distribution and inspection of market milk. Prerequisites: Biol. 206; D.S. 202.

**303. Dairy Cattle Judging. (0-3). Credit 1. I**

Comparative judging of dairy cattle. Economic value of dairy type. Student contests and commercial judging techniques. Prerequisite: D.S. 202.

**307. Judging Dairy Products. (0-2). Credit 1. II**

Practice in judging and scoring dairy products according to consumer preference, established student contest, and commercial standards. Prerequisite: D.S. 202 or approval of instructor.

**310. Advanced Dairy Cattle Judging. (0-2). Credit 1. II**

Advanced dairy cattle judging with particular attention to show ring type and breed registry association classification. Prerequisite: D.S. 303, or approval of instructor.

**311. Technical Control of Dairy Products. (2-6). Credit 4. II**

Methods of analysis of milk and milk products, and their use in controlling composition and quality of dairy products. Prerequisites: Chem. 223, 231; D.S. 301.

**316. Butter and Cheese Manufacture. (3-4). Credit 4. II**

Processing procedures in commercial manufacture of domestic and foreign cheeses; creamery butter manufacture. Prerequisites: D.S. 301, 320.

**320. Bacteriology of Dairy Products. (3-3). Credit 4. I**

Relation of microorganisms to quality in milk and milk products; starter and fermented milk culture management, sanitary control on farms and in commercial dairies; standard analytical procedures according to American Public Health Association. Prerequisite: Biol. 206.

**324. Commercial Dairy Products. (2-2). Credit 3. II**

Manufacture of butter, cheese, condensed and dried milks, and frozen desserts. Required in dairy production option; may be elected by non-majors. Prerequisite: D.S. 202. (Offered in 1965-66 and in alternate years thereafter.)

**326. Food Bacteriology. (3-3). Credit 4. II**

Microbiology of human foods and accessory substances. Study of raw and processed foods, emphasizing the physical, chemical, and biological phases of spoilage. Standard industry techniques of inspection and control. Prerequisite: Biol. 206.

**407. Ice Cream Manufacturing. (2-3). Credit 3. II**

Manufacture of ice cream, sherbets, and ices, and physical and chemical principles involved; ice cream plant equipment; flavoring materials; merchandising. Prerequisite: Ag.En. 213; D.S. 202.

**410. Dairy Plant Management. (1-2). Credit 2. I**

Dairy plant operating efficiency. Special economy problems related to handling of fluid milk, butter, cheese, and concentrated dairy products. Prerequisite: Senior classification in dairy science or approval of instructor.

**415. Condensed and Powdered Milk. (2-2). Credit 3. II**

Manufacture and distribution of condensed and evaporated milk, milk powder, milk sugar, casein, and other milk products. Prerequisites: Chem. 231 or equivalent; D.S. 301; one semester of physics.

**416. Milk Secretion and Milking. (1-2). Credit 2. I**

Physiology of lactation and relationship between mechanical milking and health and function of bovine mammary gland. Prerequisites: An.Sc. 303 or B.N. 410; Biol. 206.

**417. History and Development of Dairy Cattle. (2-2). Credit 3. I**

Breeding and development of dairy herd, including artificial insemination, selection of breeding animals, production testing and type classification, breeding programs, herd analysis, and review of development of breeds. Prerequisites: D.S. 202; Gen. 301.

**418. Feeding and Management of Dairy Cattle. (3-2). Credit 4. II**

Feeding, care, and management of dairy herd; calf raising, developing dairy heifers, care and dry and fresh cows, feeding for milk production, disease control, silage, buildings, and related topics. Prerequisites: An.Sc. 303 or B.N. 401; D.S. 202.

**420. Dairy Management. (1-2). Credit 2. II**

Feeding, care and management of dairy cattle, including herd improvement through breed selection, feeding for milk production, development of replacement stock and disease control. For agricultural education majors. Prerequisites: An.Sc. 303; D.S. 202; Gen. 301.

**481. Seminar. (1-0). Credit 1. I, II**

Review of current dairy literature and presentation of papers on selected dairy topics. May be elected a second time for one additional credit. Prerequisite: Senior classification.

**485. Special Problems. Credit 1 to 4. I, II**

Special problems in dairy production or dairy manufactures. May be repeated for additional credit when fewer than four credits have been earned. Prerequisites: Senior classification; approval of Department Head.

**FOR GRADUATES****601, 602. Dairy Production. (2-6). Credit 4 each semester. I, II**

Advanced study of dairy production, feeding, breeding, and management. Prerequisite: D.S. 418.

**603, 604. Dairy Manufacturers. (2-6). Credit 4 each semester. I, II**

Advanced study of dairy manufactures. Prerequisites: Graduate classification; approval of instructor.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Study of research methods and review of scientific literature dealing with individually selected problems in production or manufacturers and not pertaining to thesis or dissertation. Prerequisite: Graduate classification.

**691. Research. Credit 1 or more each semester. I, II, S**

Research leading to thesis or dissertation in respective fields of dairy production and dairy manufacturers. Prerequisite: Graduate classification.

## Department of Economics

Professors Chalk (Head), Linger; Associate Professors Putnam, Treacy; Assistant Professors Bitner, Bridges, Butler, Glasgow, Pulsipher

**203. Principles of Economics. (3-0). Credit 3. I, II, S**

Elementary principles of economics; the economic problem, measurement and determination of national income, money and banking, and theory of price. Prerequisite: Sophomore classification.

**204. Principles of Economics. (3-0). Credit 3. I, II, S**

Analysis of economic aggregates, theory of production and of the firm, international economic relations and labor problems. Prerequisite: Econ. 203.

**311. Money and Banking. (3-0). Credit 3. I, II, S**

Fundamental principles of money, credit, and banking and their exemplification in modern currency and banking history. Prerequisite: Econ. 204.

**318. Economics of Labor. (3-0). Credit 3. I, II, S**

Special attention given to labor force, unemployment, labor markets, wages, work periods, aged worker, industrial accidents, and phases of social security. Prerequisite: Econ. 204.

**319. Economic Development of the United States. (3-0). Credit 3. II**

Economic development of U. S. from colonial times to present. Prerequisite: Econ. 203.

**320. Economic Development of Europe. (3-0). Credit 3. II**

Development of wage system, expansion of markets, Industrial Revolution, and relation of industrial development to political policy. Prerequisite: Econ. 203.

**321. International Trade and Finance. (3-0). Credit 3. I**

Theory of international trade, foreign exchange, and balance of payments; tariffs, exchange controls, and other barriers to trade. Prerequisite: Econ. 204.

**323. Economic Analysis. (3-0). Credit 3. I, II**

Role of prices in directing production and distributing income under both competitive and monopolistic market situations. Prerequisite: Econ. 204.

**324. Comparative Economic Systems. (3-0). Credit 3. I**

Study of economic systems of leading nations. Prerequisite: Econ. 203.

**330. Economic Development. (3-0). Credit 3. II**

Basic concepts and problems of economic development in underdeveloped countries. Prerequisite: Approval of Department Head.

**410. Theory of Income and Employment. (3-0). Credit 3. I**

Conceptual problems of measuring national income, organization of national income accounts and determinants of aggregate levels of income, employment and prices. Prerequisite: Econ. 311.

**412. Public Finance. (3-0). Credit 3. I, II, S**

Current federal, state, and local financial practices analyzed with objective of determining appropriate changes in expenditure, tax, debt and budget policies. Prerequisite: Econ. 204.

**424. Economics of Transportation. (3-0). Credit 3. II**

Structure and functioning of highway, rail, water, and air transportation systems. Regulation of transportation industries by governmental agencies. Prerequisite: Econ. 204.

**443. Contemporary Economic Problems. (3-0). Credit 3. II**

Analysis of current problems relating to economic stability, control of monopoly power, income distribution, and international economic relations. Prerequisite: Econ. 204.

**445. Public Policy on Labor Relations. (3-0). Credit 3. II**

Economic and social issues raised by labor legislation. Right to organize and bargain collectively, machinery for adjustment of labor disputes. Prerequisite: Econ. 318.



## FOR GRADUATES

**601. History of Economic Thought. (4-0). Credit 4. I**

Survey of the period 1776-1848. Special attention devoted to original works of Smith, Malthus, West, Ricardo and Mill. Prerequisite: Approval of Department Head.

**602. History of Economic Thought. (4-0). Credit 4. II**

Primary emphasis given to emergence of marginal utility theory and analytical system of Alfred Marshall. Prerequisite: Approval of Department Head.

**606. Economics of Labor. (4-0). Credit 4. II**

Survey of theories of labor movement followed by analysis of wage and employment theories, effect of union policies and practices upon wages and employment, and role of unionism in economic stability. Prerequisite: Econ. 318.

**607. Contemporary Economic Theory. (4-0). Credit 4. I**

Survey of more important contributions to economic thought made during last generation. Current writings of important contemporary economists are read and evaluated. Prerequisite: Econ. 323.

**611. National Income Analysis. (4-0). Credit 4. I**

Development of modern static national income analysis from general equilibrium system. Roles of fiscal and monetary policy in promoting economic stability are examined. Prerequisite: Econ. 410.

**613. International Economic Policies. (3-0). Credit 3. II**

Critical examination of governmental policies toward international trade. Export and import controls, exchange controls, tariff and rehabilitation policies in relation to foreign trade. Prerequisite: Econ. 321.

**615. The American Economy, I. (3-0). Credit 3. I**

Brief historical survey of growth of capitalist institutions. Analysis of market system with particular reference to behavior of both individual and firm. Study of fluctuations in level of economics activity and macro analytical tools required for understanding causes of such fluctuations. Prerequisites: Graduate classification; approval of Department Head.

**616. The American Economy, II. (3-0). Credit 3. II**

Policy course which entails application of micro and/or macro analytical tools to following problem areas: public finance, international trade and finance, capital markets, labor markets, and social control of business. Prerequisite: Econ. 615.

**685. Problems. Credit 1 to 3 each semester. I, II, S**

Individual problems not related to thesis or dissertation. Prerequisites: Graduate classification with major or minor in economics; approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Thesis research.

**Department of Education and Psychology**

Professors Hensarling (Head), Parker, Parry, Varvel; Associate Professors Barker, Kavanaugh, Kerley, McNamee; Assistant Professors Casey, Golightly, Graves, Hope, McCandless, Randall, Stokes

## EDUCATION

**101. Improvement of Learning. (1-3). Credit 2. I, II, S**

Principles of effective learning as applied to specific college subjects. Developed through lectures, assigned readings, use of teaching machines and programmed materials.

**105. The World of Work. (0-2). Credit 1. I, II**

Designed to familiarize student who has not decided upon a vocational goal with demands, required skills, and rewards of various occupational areas. Each student will be given an opportunity for studying his aptitudes and interests and relating them to various vocational requirements.

**106. Survey of Man's Knowledge. (0-2). Credit 1. II**

Survey course designed to acquaint student with the various schools of thought and the many areas of knowledge which comprise our culture. Such disciplines as

philosophy, social and physical sciences, religion, law, and literature will be investigated.

**215. Foundations of American Education. (3-0). Credit 3. I**

Facts and concepts essential for understanding of American education. Presents sociological, historical, and philosophical development of education as part of American culture and civilization.

**351. Reading and Language Arts in the Elementary School. (3-0). Credit 3. II**

Fundamentals of teaching of reading in elementary school. Development of effective techniques used in teaching of oral and written communication, listening skill, functional grammar, handwriting, and spelling to elementary pupils. Prerequisites: Junior or senior classification; approval of Department Head.

**352. Mathematics in the Elementary School. (3-0). Credit 3. II**

Introduction to understanding of modern mathematics. Emphasis given to integration of content, history, and application of discovering techniques, using problem solving approach. Developing an understanding of four fundamental procedures, structure, measurement, sets, fraction, and communication of important mathematical concepts to elementary children. Prerequisites: Junior or senior classification; approval of Department Head.

**353. Social Studies in the Elementary School. (3-0). Credit 3. I**

Studies involving basic human needs, social processes, customs, value systems, and social problems. Content is drawn from history, geography, civics, economics, anthropology and sociology, to broaden children's understanding of people and societal organizations. Prerequisites: Junior or senior classification; approval of Department Head.

**354. Science in the Elementary School. (3-0). Credit 3. I**

Designed to help elementary teacher understand basic concepts of science and scientific methods. Content relates to natural phenomena involving physical, chemical, and biological processes. Elementary student's appreciation and interest in science are emphasized. Prerequisites: Junior or senior classification; approval of Department Head.

**421. History and Philosophy of Education. (3-0). Credit 3. I, II, S**

Evaluation of educational achievements of various nations and people of western world; development of social, religious, political, and cultural beliefs and attitudes that underlie American education today.

**423. Principles and Practices of Teaching. (3-0). Credit 3. I, II, S**

Designed for teachers. Planning and directing learning activities; instructional media; classroom management; techniques of communication of subject matter; observation of public school classes; evaluation and marking. Prerequisite: Senior classification in teacher education.

**425. Supervised Student Teaching. (2-12). Credit 6. I, II**

Observation and participation in classroom activities. Techniques of teaching student's special subjects. Two hours per week devoted to student's problems. Preparation of units of work preparatory to teaching. Supervised teaching. Prerequisites: Educ. 423; approval of Department Head.

**426. Tests and Measurements. (3-0). Credit 3. II, S**

Development of scientific measurement. Fundamental principles of sound measurement. Methods of appraising achievements of instructional objectives. Primary emphasis upon methods of constructing teacher-made objective tests and techniques for improving other types of written examinations.

**427. Principles of Guidance. (3-0). Credit 3. I, S**

Introduction to field of guidance and student personnel work. Treatment of principles underlying aims, methods, and instruments employed in counseling and guidance. Attention to relationship of instruction and guidance. Prerequisite: Psy. 301 or course in general psychology.

**436. Organization and Administration of the Elementary School. (3-0). Credit 3. S**

Functional study of participation in, and organization and administration of elementary school. Designed to meet needs of elementary school principals, supervisors, teachers, and school superintendents. Prerequisites: Twelve hours of education.

**439. Educational Statistics. (3-0). Credit 3. I, II, S**

Statistical concepts and techniques and their application in behavioral sciences. Not open to students who have credit for any other course in statistics.

**443. Elementary School Curriculum. (3-0). Credit 3. I, S**

Study of organization of elementary content areas. Examination of elementary school instructional purposes and organizational patterns designed to meet them.

**444. Secondary School Curriculum. (3-0). Credit 3. I, II, S**

Inquiry into current curriculum practices and their backgrounds, basis for curriculum reorganization, emphasis upon resource unit approach within modified curriculum structure.

**451. Physical Science for Elementary School Teachers. (3-0). Credit 3. I, II, S**

Study of physical science concepts applicable to elementary school science program. Special emphasis given to subject matter program planning, demonstrations, projects, and observations. Prerequisites: Senior classification; approval of Department Head.

**FOR GRADUATES****601. College Teaching. (3-0). Credit 3. I, S**

Conceptions of higher education underlying typical programs including general education, learning process, and effective use of techniques and instrumentalities of classroom instruction.

**606. Secondary School Administration and Supervision. (3-0). Credit 3. I, S**

Functional study of secondary school. Administration and supervision of personnel. Pupil accounting. Observations and field studies. Designed to meet needs of secondary school principals, supervisors, and superintendents. Prerequisite: Twelve hours of education.

**607. Programs and Procedures in Supervision. (3-0). Credit 3. II, S**

Designed for teachers, supervisors, and administrators. Philosophy, organization, and administration of supervision of both elementary and secondary schools. It is suggested that Educ. 639 precede this course.

**608. School Finance and Business Management. (3-0). Credit 3. S**

Study of school funds on local, state, and federal level; budgeting, systems of accounting, and reporting. Supply management as related to school efficiency. Administration of special services, maintenance of buildings, grounds, and equipment.

**609. Public School Laws. (3-0). Credit 3. S**

Review of constitutional provisions, statute laws, court decisions, and regulations governing public schools, with special reference to Texas.

**613. The School Plant. (3-0). Credit 3. S**

Study of plans for determining extent and character of present and future building and equipment needs of school unit; efficiency of present plant; operation and maintenance; planning building program.

**615. Structural Organization and Administration. (3-0). Credit 3. II, S**

Organization and administration of systems of schools and their relationships on federal, state, intermediate, and local levels. Also private, parochial, and adult education.

**616. Administration of Staff Personnel. (3-0). Credit 3. I, S**

Analysis of personnel organization and administration in school systems. Relationship of positions. Ethics, welfare, security, and professional improvement.

**623. Standardized Tests and Measurements. (3-0). Credit 3. I, S**

Principles of psychological testing. Uses and critical evaluation of tests of achievement, intelligence, aptitude, and personality.

**624. Individual Testing. (2-3). Credit 3. II, S**

Practicum in administration and interpretation of Stanford-Binet and Wechsler-Bellevue intelligence tests. Introduction to individual tests of personality. Prerequisite: Educ. 623 or registration therein.

**629. Practicum in Counseling and Guidance. (2-3). Credit 3. II**

Supervised practice in individual counseling and group guidance. Cases assigned



in Counseling and Testing Center and local public schools. Prerequisites: Educ. 624, 631 or registration therein.

**631. Techniques of Counseling. (3-0). Credit 3. I, S**

Methods of gathering, analyzing, and interpreting case data in counseling. Analysis of dynamics of counselor-counselee relationship. Interviewing techniques. Use of test results in counseling. Prerequisites: Educ. 427 or 635, 623; Psy. 634 or registration therein.

**632. Educational and Occupational Information. (3-0). Credit 3. II, S**

Sources, classification, and analysis of educational and occupational information. Occupational trends, local occupational surveys. Use of occupational information by classroom teacher and guidance specialist.

**633. Methods of Group Guidance. (3-0). Credit 3. II, S**

Methods and practices in group guidance. Homeroom, classroom, and school clubs as opportunities for guidance. Prerequisite: Educ. 427 or 635.

**635. Organization and Administration of Pupil Personnel Services. (3-0). Credit 3. I, S**

Designed to help administrators, counselors, supervisors, and teachers develop an understanding of role of pupil personnel services; responsibility for techniques of evaluating program of pupil personnel services.

**637. Advanced Elementary School Methods. (3-0). Credit 3. II, S**

Study of teaching methods, devices, and techniques of learning-teaching situations on elementary school level. Prerequisite: Twelve hours in elementary education or an elementary school certificate.

**638. Trends in Curriculum and Instruction. (3-0). Credit 3. I, II, S**

Recent research and development in theories and practices of curriculum and instruction. Special attention given to programmed subject content and new instructional media. Prerequisite: Approval of Department Head.

**639. Processes in Educational Leadership. (3-0). Credit 3. I, S**

Analysis of skills and techniques of administrator in modern school, with emphasis on democratic leadership, teacher-administrator relationships, group processes, and evaluation of administrative programs.

**640. School-Community Relationships. (3-0). Credit 3. S**

Systems of interpretation of schools to community publics. Promotion of effective school-community relations through media of communication.

**646. Internship for the School Principal. (0-9). Credit 3. I, II**

Designed to give prospective school principal on-the-job training under guidance of successful, experienced, practicing public school administrator and supervision of member of University staff. Certification requirement for principalship unless waived by Department Head.

**647. Internship for the School Superintendent. (0-9). Credit 3. I, II**

Designed to give prospective school superintendent on-the-job training under guidance of successful, experienced, practicing public school superintendent and supervision of member of University staff. Certification requirement for superintendency unless waived by Department Head.

**648. Internship for the School Business Administrator. (0-9). Credit 3. I, II**

Internship designed to give prospective school business administrator on-the-job training under guidance of successful, experienced, practicing public school administrator and supervision of members of University staff. Prerequisite: Approval of Department Head.

**651. Orientation in Business Principles and Procedures. (3-0). Credit 3. I, S**

Interdisciplinary survey course utilizing various fields in business to broaden knowledge of school superintendent and school business official. Case studies. Field studies. Prerequisite: Master's degree or approval of Department Head.

**652. Educational-Governmental Relationships. (3-0). Credit 3. II, S**

Interdisciplinary survey course utilizing various fields in political science, comparative government, American and state history. Interrelationships of educational administration to political organizations. Prerequisites: Master's degree; approval of Department Head.

**653. The Nature and Problems of Administrative Behavior. (3-0). Credit 3. I, S**  
Interdisciplinary survey course utilizing case study method. Designed to enhance understanding and improve techniques in decision making, communication, and personnel relations. Field studies, problems, and experiences. Prerequisites: Master's degree; approval of Department Head.

**681. Seminar. (1-0). Credit 1. I, S**

Problems pertinent to superintendent, principal, counselor, supervisor, and visiting teacher. Recent developments and research in different areas. Prerequisites: Eighteen hours of advanced education; approval of Department Head.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Directed individual study of selected problem in field of education. Prerequisite: Graduate classification in education.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis.

## PSYCHOLOGY

**207. General Psychology. (3-0). Credit 3. I, II, S**

Introductory course dealing with elementary principles of human behavior. Designed especially for those students majoring in social or biological sciences, pre-medicine, or education. Credit cannot be obtained for both Psy. 207 and 303.

**301. Educational Psychology. (3-0). Credit 3. I, II, S**

Application of psychology to problems of teaching. Nature and operation of laws of learning; transfer of training; nature, measurement, and significance of individual difference; conditions influencing efficiency of learning.

**302. Psychology for Secondary School Teachers. (3-0). Credit 3. I, II, S**

Basic course in educational psychology with special consideration given to guiding development and learning of adolescents. Not available to students with credit for Psy. 301 or 323. Satisfies psychology requirements of eighteen-hour minimum certification program.

**303. Psychology for Technical Students. (3-0). Credit 3. I, II, S**

Introductory course emphasizing applications of general psychology. Designed for students in agriculture, business administration, and engineering. Credit cannot be obtained for both Psy. 207 and 303.

**305. Personality Adjustments. (3-0). Credit 3. I**

Emphasis upon adjustment problems of normal people. Principles of mental hygiene in relation to family, school, and community life. Prerequisite: Psy. 207, or 301, or 303.

**307. Child Growth and Development. (3-0). Credit 3. II**

Growth and development of normal child from infancy to adolescence with emphasis on elementary school years. Prerequisite: Psy. 207, or 301, or 303.

**309. Differential Psychology. (3-0). Credit 3. I**

Individual and group differences essential to evaluation of test results and behavior. Distribution and extent, causative factors, trait organization. Prerequisite: Psy. 207 or 303 or advanced classification in engineering.

**311. Comparative Psychology. (3-0). Credit 3. I**

Survey of problems, principles, and methods of animal psychology with emphasis on animal learning, motivation, discriminative processes and abnormal, social, and instinctual behaviors. Prerequisites: Biol. 107 or 108; Psy. 207 or 303.

**319. Systematic Psychology. (3-0). Credit 3. II**

A description and analysis of contemporary schools, theories and viewpoints in psychology. Prerequisites: Six hours of psychology; advanced classification.

**323. Psychology of Adolescence. (3-0). Credit 3. I, II, S**

Psychological problems of normal teen-age individual, including consideration of ways and means of aiding youth to meet these problems constructively. Prerequisite: Psy. 207, or 301, or 303.

**401. Industrial Psychology. (3-0). Credit 3. I, II, S**

Individual differences and their evaluation. Employee dynamics, counseling, com-

munication, training. Job analysis, job evaluation, objective factors in performance. Prerequisites: Psy. 207 or 303, or advanced classification in industrial engineering or technology.

**403. Dynamics of Human Behavior. (3-0). Credit 3. II**

Development and integration of personality. Theories of personality. Motivation and adjustment mechanisms. Maladjustment and its sources. Prerequisites: Introductory psychology; Psy. 305 or graduate classification in education or sociology.

**406. Psychology of Learning. (3-0). Credit 3. I**

Survey of significant concepts, experimental methods, and principles of learning. Prerequisite: Psy. 207, or 301, or 303.

**408. Experimental Psychology. (2-3). Credit 3. II**

Applications of experimental method to psychology. Principles and techniques in areas of reaction time, simple motor phenomena, sensation, perception, learning, and social interaction. Prerequisite: Psy. 406 or advanced classification in industrial engineering.

**436. Techniques of Research. (3-0). Credit 3. I, II, S**

Fundamental concepts and tools of research applied to psychological and educational problems. Rationale of research, analysis of problems, library skills, sampling, appraisal instruments, statistical description and inference, writing the research report, and representative research designs.

**485. Problems. Credit 1 to 3. I, II, S**

Directed readings or research problems in selected areas designed to supplement existing course offerings. Individual report required. Prerequisites: Junior or senior classification; approval of Department Head.

### FOR GRADUATES

**634. Principles of Human Development. (3-0). Credit 3. I, S**

Biological, psychological, and cultural interrelationships in human development. Emphasis upon principles and methods as illustrated in research and theoretical contributions. Experiences in procedures of child study. Prerequisite: Graduate classification.

## Department of Electrical Engineering

Professors German, Hallmark (Head), Haupt; Associate Professors Barnard, Denison, Druce, Rekoff; Assistant Professors Jones, Worley; Instructors Beasley, Burkes, Dickerson, Green, Langston, Meeks, Ray, Vines, Whatley

**201. Electricity and Magnetism. (3-4). Credit 4. I, II, S**

Lectures, recitations, and problems in electricity and magnetism. Laboratory investigation of phenomena studied in textbooks. Prerequisite: Math. 307 or registration therein.

**214. Electrical Circuit Theory. (3-3). Credit 4. I, II, S**

Introduction to electrical circuit theory. Complex numbers, phasor algebra, and response of single mesh and series-parallel circuits. Resonance phenomena and poles and zeroes of impedance and admittance are defined. Prerequisites: E.E. 201; Math. 308 or registration therein.

**305. Electrical Circuits and Machines. (3-3). Credit 4. I, II, S**

Study of fundamental principles of electrical circuits, electronic circuits, machines, and control devices. Practice designed to familiarize general engineering student with test procedures for and characteristics of both direct and alternating current machines. Prerequisites: Math. 122 or 210; Phys. 219.

**307. Electrical Circuits. (3-3). Credit 4. I, II, S**

Study of fundamental principles of direct and alternating current circuits, magnetic circuits, and transformers. Practice includes measurement of circuit phenomena. Prerequisites: Math. 122 or 210; Phys. 219.

**308. Electrical Machinery. (2-3). Credit 3. I, II, S**

Study of principal types of electrical machines and servomechanisms, including their characteristics, applications, and control devices. Practice includes actual opera-



tion and testing of electrical machinery and equipment most commonly used in industry. Prerequisite: E.E. 307.

**322. Electric and Magnetic Fields. (3-0). Credit 3. II, S**

Application of vector analysis to theory of electric and magnetic fields. Maxwell's equations used to study propagation and reflection of electromagnetic waves. Prerequisites: E.E. 214; Math. 308.

**323. Electrical Circuit Theory. (3-0). Credit 3. I, II**

General circuit analysis and theorems for lumped constant, passive circuits. Steady state and transient response studied by classical methods and by behavior of impedance and admittance functions in complex frequency plane. Prerequisites: E.E. 214; Math. 308.

**324. Electrical Circuit Theory. (3-0). Credit 3. II, S**

Continuation of study of lumped constant passive circuits, including transform methods of analysis, two terminal pair networks and three-phase circuits. Prerequisites: E.E. 323; Math. 308.

**325. Electronics. (3-0). Credit 3. I, II**

Introduction to theory of electron tubes and transistors. Thermionic, gaseous, light sensitive, and cathode ray tubes; solid state devices, rectifier circuits and amplifier equivalent circuits. Prerequisites: Registration in E.E. 323; Phys. 220.

**326. Electronic Circuits. (3-0). Credit 3. II, S**

Study of basic circuits used in radio, television, and computers. Analytical study of modulators, demodulators, oscillators, and amplifiers. Prerequisites: E.E. 325, registration in 324.

**327. Electrical Laboratory. (1-3). Credit 2. I, II**

Studies of precision and accuracy of measurement. Electronic instrumentation and applications to passive and active networks. Prerequisites: E.E. 323, 325 or registration therein.

**328. Electrical Laboratory. (1-3). Credit 2. II, S**

Studies of precision and accuracy of measurement, electronic instrumentation and applications to passive and active networks. Prerequisites: E.E. 324, 326, 330 or registration in these courses.

**330. Electrical Machinery. (3-0). Credit 3. I, II, S**

Introduction to energy conversion concepts and devices with detailed study of DC machines. Prerequisites: E.E. 324, 328 or registration therein.

**331. Theory and Application of Electron Devices. (3-3). Credit 4. I, S**

For students other than electrical engineering majors. Study of theory of operation and characteristics of electronic devices and circuits with emphasis on instrumentation and control. Prerequisite: E.E. 305 or 307.

**401. Electrical Machinery. (3-0). Credit 3. I, II**

Graphical and mathematical study of electrical machines, including transformers. Prerequisites: E.E. 324, 330, and registration in 403.

**402. Electromechanical Energy Conversion. (3-0). Credit 3. II**

Advanced study of electromechanical energy conversion phenomena. Topics covered fall in general area of generalized machine theory, electromechanical transducers, and advanced analysis of specialized machines. Prerequisites: E.E. 401, 403.

**403. Electrical Laboratory. (0-6). Credit 2. I, II**

Laboratory study of electrical machines covered in E.E. 401. Prerequisite: Registration in E.E. 401.

**404. Electrical Laboratory. (0-6). Credit 2. II, S**

Laboratory course devoted to individual design projects based on material covered in prerequisite courses. Prerequisites: E.E. 401, 403, 439, registration in 420.

**415. Transmission Networks. (2-2). Credit 3. I**

Analytical study of theory of transmission lines and impedance matching devices. Hyperbolic-function treatment generalized to apply to power, electronic, and communication circuits. Laboratory will consist of group problems and demonstrations. Prerequisite: E.E. 324.

**420. Servomechanisms and Control Devices. (3-0). Credit 3. II, S**

General study of closed-loop control devices, including electrical, hydraulic and mechanical systems. Prerequisites: E.E. 307 or 323; Math. 308.

**428. Communications Circuits. (2-3). Credit 3. I**

Study of principles used in communications, including telephone and telegraph systems, transmission theory, inductive interference, networks, filters, loading, repeater and carrier systems. Prerequisite: E.E. 439 or registration therein.

**432. Economic Phases of Engineering. (2-0). Credit 2. II**

Problems in mathematics of finance, depreciation, engineering economy, accounting, distribution factors, and rates with particular reference to electric power industry. Prerequisite: E.E. 401.

**439. Electronic Systems. (3-0). Credit 3. I, II**

Study of application of devices and circuits to complete systems in field of communication, instrumentation, and control. Prerequisites: E.E. 324, 326, 328.

**451. Applied Electromagnetic Theory. (3-0). Credit 3. I**

Static boundary value problems; conformal transformation; Schwartz transformation; rectangular harmonics; cylindrical harmonics; spherical harmonics; Maxwell's equations applied to antennas; radiation; fields and power calculations; antenna impedances. Prerequisites: E.E. 322; Math. 308.

**452. Ultra High Frequency Techniques. (2-3). Credit 3. II**

Introduction to theory and practice of ultra high frequency radio wave generation, transmission, and radiation. Development of Maxwell's equations and their application to transmission of electrical energy in wave guides. Prerequisites: E.E. 322, 326.

**454. Advanced Electronic Circuits. (3-0). Credit 3. II**

Study of electronic circuits used for pulsing, counting, computing, and regulating and as wide band amplifiers. Transistor and tube elements. Laboratory will consist of measurements on typical devices. Prerequisite: E.E. 439 or registration therein.

**456. Communication Theory. (3-0). Credit 3. II**

Introduction to processing and transmission of information with emphasis on mathematics and block diagrams of systems. Elements of information theory, effects of signal-noise ratio, methods of modulation and demodulation. Prerequisite: E.E. 439.

**457. Principles of Electronic Computers. (3-3). Credit 4. I, II**

Organization and internal operation of analog and digital computers; function integration, addition, multiplication, and generation; analog system stimulation; switching networks; digital computer memories, input and output devices; arithmetic unit. Prerequisite: E.E. 439 or registration therein.

**459. Electric Power Systems I. (2-2). Credit 3. I**

General considerations in transmission and distribution of electrical energy as related to power systems. Calculation of electric transmission line constants and load flow studies. General theory of symmetrical components. Prerequisite: E.E. 324.

**460. Electric Power Systems II. (2-2). Credit 3. II**

Study of electric power systems during fault conditions by applications of method of symmetrical components. Power system transient stability studies. Economic system loading and automatic load flow control. Prerequisite: E.E. 459.

**461. Electronic Instrumentation. (2-3). Credit 3. I**

A course for students who are not electrical engineering majors that is devoted to applications of electronic instruments to research problems in field of measurements and control systems. Transducers, bridge measurements, signal conditioning, recorders, and other indicators. Prerequisite: E.E. 331 or equivalent.

**485. Problems. Credit 1 to 3 each semester. I, II**

Problems of limited scope approved on individual basis intended to promote independent study. Results of study will be presented in writing, and an oral presentation to staff and students will be required. Prerequisites: Senior classification; approval of Department Head.

## FOR GRADUATES

**601.\* Linear Network Analysis. (3-4). Credit 4. I, S**

Fourier and Laplace transform methods of analysis applied to linear networks having periodic, transient, or random excitation.

**602.\* Nonlinear Network Analysis. (3-4). Credit 4. II**

Analysis and application of nonlinear electrical and electronic systems. Introduction to stability and phase plane analysis.

**605.\* Linear Servomechanisms. (3-3). Credit 4. I**

Continuation of E.E. 420 to include advanced topics which will extend study of analytic methods as applied to linear systems and introduce concepts related to linear systems synthesis. Prerequisite: E.E. 420.

**606. Nonlinear Servomechanisms. (3-0). Credit 3. II**

Study of techniques available to analyze nonlinear systems and discontinuous systems, and a study of associated synthesis procedures. Prerequisites: E.E. 605; Math. 617.

**607. Alternating Current Circuits and Machines. (3-4). Credit 4. I**

Study of transient conditions in electrical machines.

**611. Symmetrical Components Applied to Electrical Engineering. (3-4). Credit 4. I**

Solution of unbalanced electrical circuits by means of symmetrical components; study and measurements of machine constants by means of oscillograph.

**624. Electronic Circuits for Instrumentation and Computation. (3-3). Credit 4. II**

Analysis and design of electronic circuits used in instrumentation and computation. Amplifiers, "and" circuits, "or" circuits, and "gate" circuits. Problems of drift compensation in DC amplifiers and closed-loop stability in multi-stage amplifiers treated in detail. Prerequisites: E.E. 326, 457.

**628.\* Design of Active Networks. (4-0). Credit 4. II**

Study of regeneration and feedback theory with emphasis on circuit design methods suitable for treatment of these topics. Prerequisites: E.E. 601; Math. 601 or equivalent.

**629. System Engineering. (3-0). Credit 3. I**

Study of processes of systems engineering, a discipline concerned with planning, organization, and management of programs for developing large, highly complex systems. Establishing of need, selection of objectives, environmental research, decision making, selecting optimum system, analysis, synthesis, and communication interface problems. Prerequisite: E.E. 605 or approval of instructor.

**636. Network Synthesis. (4-0). Credit 4. I**

Synthesis of electrical networks having arbitrarily specified terminal characteristics. Realizability conditions, realization of general two-terminal and four-terminal networks, and approximation of network specifications. Prerequisites: E.E. 601; Math. 601.

**637. Wave Guides and Cavities. (3-0). Credit 3. I**

Application of Maxwell's equations to solution of guided electromagnetic fields. Studies in skin effect, parallel plane wave guides, rectangular wave guides, circular wave guides, cavities, and microwave networks. Prerequisite: E.E. 451.

**638. Antennas and Propagation. (3-0). Credit 3. II**

Application of Maxwell's equations to determine electromagnetic fields of antennas. Studies in radiation, directional arrays, impedance characteristics, aperture antennas, propagation in free space, and propagation through ionosphere. Prerequisite: E.E. 451.

**642. Transistors. (3-3). Credit 4. I, S**

Theory of junction triodes; voltage, current, power and frequency limitations. Small signal parameters and equivalent circuits for transistors; analysis of design of circuits at both small and large signal levels. Prerequisite: E.E. 326.

**644. Sampled Data Servomechanisms. (3-0). Credit 3. II**

Study of techniques for analysis of sampled data and discrete data servo systems and associated synthesis procedures. Prerequisites: E.E. 605; Math. 617.

\*In the summer session these courses may be divided into two parts, a and b, each with two hours of credit.



**646. Statistical Communication Theory. (3-0). Credit 3. II**

Generalized harmonic analysis of deterministic and random signals; elements of probability and statistics; detection of signals in noise; sampling theory; optimum linear systems. Prerequisites: E.E. 601; Math. 601.

**648. Electromagnetic Wave Propagation. (3-0). Credit 3. II**

Study of electromagnetic surface waves; direct and ground-reflected space waves; tropospheric refraction, reflection, and scattering; ionospheric refraction, reflection, and scattering; propagation via meteor trails and whistlers; space communication. Prerequisite: E.E. 451.

**653. Electronic Computer Design. (3-3). Credit 4. I, S**

Function generation and system simulation for analog solution of differential equations, simulation techniques applied to control systems; advanced study of digital adders, subtractors, accumulators, multipliers, and dividers; digital error-detection; digital control. Prerequisite: E.E. 457.

**685. Problems. Credit 1 to 4 each semester. I, II**

Research problems of limited scope designed primarily to develop research technique.

**691. Research. Credit 1 or more each semester. I, II**

Research for thesis or dissertation.

## Department of Engineering Graphics

Professors Cleland, Oliver, Ransdell, Stark, Street (Head); Associate Professors Earle, Mason; Assistant Professor Bardell; Instructor Guerard

**105. Engineering Graphics. (0-6). Credit 2. I, II, S**

Geometry of graphical construction, freehand lettering, projection drawings, revolutions, auxiliaries, sections and conventions, sketching, pictorials, dimensioning, fastenings, engineering drawings. Required for beginning engineering students.

**106. Descriptive Geometry. (0-6). Credit 2. I, II, S**

Theory of principal projections. Primary and successive auxiliary views, revolutions, engineering layouts. Graphical solutions of engineering problems. Required for beginning engineering students. Prerequisite: E.G. 105.

**127. Industrial Freehand Sketching. (1-3). Credit 2. II**

Basic techniques of freehand drawing in line and tone; delineation of form, textures, materials, sketching, shades and shadows, perspectives, and industrial applications of freehand drawing.

**128. Methods of Industrial Reproduction. (0-2). Credit 1. II**

Basic techniques of reproduction processes for industrial use and study of current processes used in industry.

**209. Nomography. (2-0). Credit 2. II, S**

Application of engineering graphics for presentation of engineering and scientific data and for solution of problems encountered in many phases of engineering and science. Prerequisites: E.G. 106; Math. 121 or equivalent.

**221. Building Construction Drawing. (1-3). Credit 2. II**

(Architectural) Architectural details in frame and masonry construction; general drawings and techniques of presentation; development of construction plans and details. Prerequisite: E.G. 105 or equivalent.

**403. Graphical Computation Devices. (1-3). Credit 2. II, S**

To teach theory and methods of construction of graphical computation devices and to apply their use to solutions of engineering and scientific problems. Prerequisite: E.G. 209 or equivalent.

## FOR GRADUATES

**601. Advanced Industrial Drawing. (2-3). Credit 3. I, S**

For high school and college teachers. Problems pertinent to all industrial fields. Research and visual aids development. Study of current industrial graphical practices. Prerequisites: E.G. 106, 127 or equivalent.

**603. Advanced Machine Drawing. (1-6). Credit 3. II, S**

For high school and college teachers. Conventional practices, pictorial sketches, dimensioning. Visual aids development, creative design, analysis and synthesis, machine components. Prerequisite: E.G. 106 or equivalent.

**605. Spherical Projections.\* (2-0). Credit 2. I, S**

Graphical cartography, spherical projections and industrial applications, great circles, rhumb lines, and other global projections, and geodesic domes. Designed for advancement of teacher and industrial designer. Prerequisite: E.G. 106 or equivalent.

**606. Stereographic and Clinographic Projections.\* (2-0). Credit 2. II, S**

Research and experimentation with stereographic (3 dimensional) photography and drawing as applied to industry and teaching. Development of audio-visual presentations and teaching aids. Graphical investigation of crystal projections, perspectives, and related systems. Prerequisite: E.G. 106 or equivalent.

**607. Descriptive Geometry for Teachers.\* (4-0). Credit 4. II, S**

Research of early and current applications of descriptive geometry to scientific problems. Research and study of new scientific principles for advancement and improvement of teachers of current graphics curricula. Prerequisites: E.G. 106; I.Ed. 323 or equivalent.

**611. Technical Illustration.\* (3-3). Credit 4. I, S**

Axometric projection—*isometric*, *dimetric*, *trimetric*, and *pseudo representations*, *oblique*, *pseudo-obliques*, and *perspectives*. Commercial and technical illustrating—*airbrush*, *pencil rendering*, *ink delineations*, and other methods. Prerequisite: E.G. 601 or equivalent.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Special research problems to fit needs of individual student. Prerequisites: E.G. 106; I.Ed. 323; graduate classification; approval of instructor.

## Department of English

Professors Abbott, Anderson (Head), Ballinger, Ekfelt, Hays, Laverty, Martin, Morgan, Stokes; Associate Professors Barzak, Bennett, Elmquist, Hauer, Hierth, Hunter, Kidd, Kroitor; Assistant Professors Cox, Creswell, Crittenden, Esten, Guinn, Huggett, Jernigan, Kadow, Keel, Mattern, Peirce, Schatte, Schrader, Shepperd, Wienen; Instructors Archer, Harlan, Kell, Long, Rodewald, Schoenewolf, Swanzy

## ENGLISH

**100. English for Foreign Students. (3-0). Credit 3. II, S**

Speaking and writing for students whose native language is not English. Students entering course are expected to have studied English and to be able to communicate in English. No credit granted for satisfactory completion of this course. (See entry for Course 100 under Department of Modern Languages.)

**103. Composition and Rhetoric. (3-0). Credit 3. I, II, S**

Composition of short papers, with emphasis on sentence structure, paragraph development, and paper organization. Analysis of expository prose.

**104. Composition and Rhetoric. (3-0). Credit 3. I, II, S**

Continuation of Engl. 103. More complex methods of paper development; investigative papers. Readings in prose. Prerequisite: Engl. 103 or advanced standing.

**203. Introduction to Literature. (3-0). Credit 3. I, II, S**

Readings in following types: plays, stories, novels, and poems, chiefly modern, Papers on readings. Prerequisite: Engl. 104.

**210. Introduction to Logical Discourse. (3-0). Credit 3. I, II, S**

Principles of argument and their application in reading and writing. Prerequisite: Engl. 104.

**212. Shakespeare. (3-0). Credit 3. I, II, S**

Study of major plays of Shakespeare, with lectures on his art, his language, and his cultural environment. Prerequisite: Engl. 104.

\*Primarily for graduate students interested in education. Not available for major or minor work toward an engineering degree except by permission of the Dean of Graduate Studies.

**231. Survey of English Literature. (3-0). Credit 3. I, II, S**

Literature of England from Anglo-Saxon times to late eighteenth century. Prerequisite: Engl. 104.

**232. Survey of English Literature. (3-0). Credit 3. II, S**

Continuation of Engl. 231. Literature of England from mid-eighteenth century to twentieth century. Prerequisite: Engl. 104.

**301. Writing for Professional Men. (3-0). Credit 3. I, II, S**

Advanced writing in scientific and technical fields; technical reports and papers; business correspondence. Prerequisite: Completion of freshman-sophomore English program.

**315. Seventeenth Century Literature. (3-0). Credit 3. I, S**

Period course in English poetry and prose of seventeenth century, not including Shakespeare. Prerequisites: Two courses in sophomore English.

**316. Eighteenth Century Literature. (3-0). Credit 3. II, S**

Period course in English poetry and prose of eighteenth century: Dryden to Blake. Prerequisites: Two courses in sophomore English.

**321. Nineteenth Century Literature (Romantic). (3-0). Credit 3. I, S**

Period course in English poetry and relevant prose of Romantic Movement. Prerequisites: Two courses in sophomore English.

**322. Nineteenth Century Literature (Victorian). (3-0). Credit 3. II, S**

Period course in English poetry and relevant prose of major Victorian authors. Prerequisites: Two courses in sophomore English.

**325. Creative Writing. (3-0). Credit 3. I**

Writing of short stories, poetry, plays, and feature articles. Limited to students who have made an average of C in prerequisite courses. Prerequisites: Two courses in sophomore English.

**327. American Literature to 1870. (3-0). Credit 3. I**

American literature from Colonial Period through Civil War. Prerequisites: Two courses in sophomore English.

**328. American Literature from 1870 to 1920. (3-0). Credit 3. II**

American literature from Whitman to Frost. Prerequisites: Two courses in sophomore English.

**329. Folklore and Folk Songs. (3-0). Credit 3. II**

Elements of folklore: beliefs, folktales, folk medicine, arts and crafts; American and regional folklore; ballads and folk songs. Individual collecting. Prerequisite: Engl. 104.

**334. Science in Literature. (3-0). Credit 3. II**

Main developments in history of science as presented in literature of Western World. Prerequisites: Two courses in sophomore English. (Offered in 1966-67 and in alternate years thereafter.)

**336. Life and Literature of the Southwest. (3-0). Credit 3. II**

Culture of Southwest as expressed in literature. Prerequisite: A course in sophomore English. (Offered in 1966-67 and in alternate years thereafter.)

**340. Modern Drama. (3-0). Credit 3. II, S**

Representative European and American plays from Ibsen to mid-twentieth century. Prerequisites: Two courses in sophomore English. (Offered in 1966-67 and in alternate years thereafter.)

**341. Advanced Composition. (3-0). Credit 3. II**

Study of pattern and style in effective prose through analysis and writing of expository, descriptive, and argumentative essays of length and maturity expected of junior students. Emphasis on developing personal writing techniques suited to diverse fields of specialization. Prerequisites: Completion of freshman-sophomore English program or approval of instructor.

**350. Modern Literature. (3-0). Credit 3. I**

British and American novelists, poets, and dramatists from about 1920 to the present, with lectures on social and intellectual background. Prerequisites: Two courses in sophomore English. (Offered in 1966-67 and in alternate years thereafter.)



**371. Great Books. (3-0). Credit 3. I, S**

Typical works: The Book of Job, Sophocles' Theban plays, Roman lives (from Plutarch), Chaucer's *The Canterbury Tales*, Shakespeare's *Antony and Cleopatra*, Voltaire's *Candide*, Melville's *Moby Dick*, Tolstoy's *Anna Karenina*, MacLeish's *J. B.*  
Prerequisite: Completion of sophomore program in English.

**372. Great Books. (3-0). Credit 3. II, S**

Typical works: Homer's *Iliad*, Vergil's *Aeneid*, Dante's *Inferno*, Cervantes' *Don Quixote*, Marlowe's *Doctor Faustus*, Goethe's *Faust* (Part I), Dostoyevsky's *Crime and Punishment*, James' *The Turn of the Screw*. Prerequisite: Completion of sophomore program in English.

**375. Nineteenth Century American Novel. (3-0). Credit 3. I**

Representative novels of nineteenth century; lectures. Prerequisite: One course in sophomore English. (Offered in 1965-66 and in alternate years thereafter.)

**376. Twentieth Century American Novel. (3-0). Credit 3. II**

Representative novels of twentieth century; lectures. Prerequisite: Completion of sophomore program in English. (Offered in 1966-67 and in alternate years thereafter.)

**409. Introduction to Linguistics. (3-0). Credit 3. I**

Study of nature of language and of modern linguistic science, including phonetics and phonemics. Prerequisite: Two courses in sophomore English.

**410. History of the English Language. (3-0). Credit 3. II**

Survey of history of grammar, vocabulary, and sounds of English language, with brief discussion of related languages. Prerequisites: Two courses in sophomore English.

**412. Shakespeare. (3-0). Credit 3. II**

Analysis of plays, texts, language, dramatic theory; Shakespearean criticism and scholarship. Prerequisite: Engl. 212 or six hours of advanced literature courses.

**417. English Drama to 1642. (3-0). Credit 3. II**

Significant plays, excluding Shakespeare, from mystery cycles and moralities to closing of theaters. Prerequisite: Engl. 212 or six hours of advanced literature courses. (Offered in 1965-66 and in alternate years thereafter.)

**426. Nineteenth Century English Prose. (3-0). Credit 3. I**

Non-fiction prose of such representative writers as Lamb, Hazlitt, Macaulay, Carlyle, Ruskin, Arnold, Mill, Shaw. Prerequisites: Six hours of advanced literature courses. (Offered in 1965-66 and in alternate years thereafter.)

**427. The English Novel to 1870. (3-0). Credit 3. I**

The novel from Richardson and Fielding to George Eliot; eight to ten representative works; lectures, papers. Prerequisites: Two courses in sophomore English. (Offered in 1966-67 and in alternate years thereafter.)

**428. The Novel in English. (3-0). Credit 3. II**

The novel from George Eliot to early twentieth century; eight to ten representative works; lectures, papers. Prerequisites: Two courses in sophomore English. (Offered in 1965-66 and in alternate years thereafter.)

**431. Chaucer. (3-0). Credit 3. I**

Poetry, language, literary forms, and social institutions of pre-Renaissance period as seen in Chaucer's works. Prerequisite: Engl. 231 or six hours of advanced literature courses.

**461. Teaching of Language and Composition. (3-0). Credit 3. I, S**

Points of view toward language study; problems in teaching composition; practice in assigning, writing, grading, and criticizing short and long papers. Prerequisite: Senior classification or approval of instructor.

**463. History and Theory of Literary Criticism. (3-0). Credit 3. II, S**

Analysis of major works of literary theorists from Aristotle to present; trends and values in criticism. Prerequisites: Six hours of advanced literature courses. (Offered in 1965-66 and in alternate years thereafter.)

**485. Problems. Credit 1 to 3. I, II, S**

Readings for specific needs of major or minor in English; individual supervision; no class meetings; written reports. Prerequisites: Eighteen hours of English; approval of Department Head.

**FOR GRADUATES****613. Studies in the Renaissance. (3-0). Credit 3. I**

Poetry, prose, and drama of English Renaissance exclusive of Shakespeare. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**614. Studies in the Renaissance: Non-Dramatic Literature. (3-0). Credit 3. II, S**

Major writers of non-dramatic prose and poetry of English Renaissance: Wyatt, Surrey, Sidney, Spenser, Marlowe, Raleigh, Shakespeare, Drayton, Jonson, and Donne. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**615. Seventeenth Century English Literature. (3-0). Credit 3. I, II, S**

Poetry and prose of chief writers of seventeenth century: Bacon, Donne, Jonson, Herrick, Milton, and Dryden. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**616. Studies in the Eighteenth Century. (3-0). Credit 3. I**

Poetry and prose to 1750, concentrating on Defoe, Addison, Swift, Pope, Thomson, and Young, with emphasis on aesthetic, scientific, and religious ideas. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**617. Studies in the Eighteenth Century: The Age of Johnson. (3-0).****Credit 3. II, S**

Prose, including the novel, in latter half of century, concentrating on Fielding, Johnson, Boswell, Goldsmith, Sheridan, Hume, and Gibbon, with emphasis on aesthetic, scientific, and philosophic ideas. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**633. Studies in the Nineteenth Century: The Romantic Age. (3-0). Credit 3. I**

Romantic writers, along with literary, religious, and scientific issues of century. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**634. Studies in the Nineteenth Century: The Victorian Age. (3-0). Credit 3. II, S**

Prose and poetry from Carlyle to Shaw. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**649. Studies in the Twentieth Century: British Literature. (3-0). Credit 3. I**

Selected authors since 1900: Yeats, Joyce, Huxley, and others. Emphasis upon development of particular literary movement or literary form. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**650. Studies in the Twentieth Century: American Literature. (3-0). Credit 3. II**

Selected authors since 1900: Robinson, Frost, Eliot, Lewis, Faulkner, Hemingway, and others. Emphasis on particular literary movement or literary form. Research papers. Prerequisite: Graduate classification or approval of the Department Head.

**674. Studies in American Literature: The Age of Transcendentalism. (3-0).****Credit 3. I, S**

Backgrounds of Transcendentalism in Europe; the movement in the U. S.; works of Emerson, Hawthorne, Poe, Whitman, Melville, Thoreau, and others. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**675. Studies in American Literature. (3-0). Credit 3. II**

Social and literary backgrounds of Gilded Age; emergence of American humor and realism, and their development in Mark Twain and early Henry James. Research papers. Prerequisite: Graduate classification or approval of Department Head.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Special readings designed to supplement student's knowledge of English and American literature in subjects which he has not studied in other courses. Research papers. Prerequisites: Graduate classification; approval of Department Head.

**691. Research. Credit 1 to 4. I, II, S**

Research for thesis. Prerequisite: Graduate classification.

## SPEECH

**343. Discussion and Debate. (3-0). Credit 3. I**

Techniques of discussion and debate, including participation in various kinds of discussions, analysis of a debate proposition, building of debate file, preparation of a brief, and practice in debating.

**403. Public Speaking. (3-0). Credit 3. I, II, S**

Speech training for technical students. Speeches of social and technical interest, demonstration talks, book reviews, group discussions, and parliamentary procedure. Prerequisite: Completion of sophomore program in English. (Students may not receive credit for both Speech 403 and 407.)

**407. Oral Interpretation. (3-0). Credit 3. II**

Instruction and practice in the art of oral interpretation: poetry, fiction, and drama. (Students may not receive credit for both Speech 403 and 407.) Prerequisite: Completion of sophomore program in English.

## THEATER ARTS

**378. Techniques of Acting. (3-0). Credit 3. I**

Instruction and practice in fundamentals. Voice and diction, stage movement, character analysis and development, and styles of acting. Prerequisite: Sophomore classification or approval of instructor.

**380. History of the Theater. (3-0). Credit 3. I**

Survey of theater from beginning to present. Prerequisite: Completion of sophomore program in English or approval of instructor.

**381. Introduction to Theater. (2-3). Credit 3. I**

Plays from point of view of director, actor, technician. Prerequisite: Sophomore classification or approval of instructor.

**382. Technical Theater. (2-3). Credit 3. II**

Methods of staging plays—scene design, construction, stage lighting. Prerequisite: Completion of sophomore program in English.

**383. Techniques of Directing. (3-0). Credit 3. II**

For beginning directors; theories of directing; participation in scheduled plays. Prerequisites: Th.A. 381, 382.

## Department of Entomology

Professors Adkisson, Gaines (Head); Associate Professors Hanna, Price, Randolph, Weaver; Assistant Professors Burke, Dorough, Schaffner, Van Cleave

**201. General Entomology. (2-2). Credit 3. I, II, S**

Study of principal orders of insects; relation of anatomy and physiology of insects to control methods; principal insecticides and their uses; development, habits, and economic importance of more common insects with control methods for injurious species.

**208. Veterinary Entomology. (2-3). Credit 3. I, II**

Study of insects and other arthropods that are parasitic upon domestic animals concerned primarily in transmission of diseases. Methods of eradication and control emphasized. Prerequisite: First year veterinary medicine or sophomore animal science classification.

**301. Systematic Entomology. (2-3). Credit 3. I**

Systematic study of orders and families of insects, and distinguishing characteristics of representative species. Preparation of insect collections and use of keys for identification emphasized in practice. Prerequisite: Ento. 201 or equivalent.

**302. Systematic Entomology. (2-3). Credit 3. II**

Continuation of Ento. 301, including orders and families of insects not studied in Ento. 301. Prerequisite: Ento. 301.

**305. Insect Morphology. (2-3). Credit 3. I**

General morphology of typical insects with special emphasis on those structures of particular importance in systematic and applied entomology. Prerequisite: Ento. 201 or equivalent.



**306. Insect Physiology. (2-3). Credit 3. II**

Internal anatomy and principles of physiology as applied to insects. Prerequisite: Ento. 305.

**313. Biology of Insects. (2-3). Credit 3. I**

Emphasis placed on orders and important families of Hexapoda, their marks of identification, general biology, and their relations to other animals. Identification of insects and other arthropods stressed in laboratory. Prerequisite: Three hours of biological sciences.

**401. Principles of Insect Control. (2-3). Credit 3. I**

Study of both applied and natural controls emphasizing uses, practical application, and physical and chemical properties of more important insecticides. Prerequisite: Ento. 201.

**402. General Economic Entomology. (2-3). Credit 3. II**

Nature of injury, life history, habits and control of common insects attacking stored products, cereal, forage, cotton, ornamentals, fruits, vegetables, man, household, and livestock. Practical methods of insect control are demonstrated in laboratory. Prerequisite: Ento. 201.

**405. Horticultural Pests. (2-2). Credit 3. II**

Biologies, types of damage, and recognition of pests of fruit, nut, truck crops, and ornamental plants considered. Approved insecticidal, biological, and natural control measures are studied. Prerequisite: Ento. 201 or equivalent.

**423. Comparative Anatomy of Arthropods. (2-3). Credits 3. I**

Study of biology, disease transmission or causation, and control of arthropods that are parasitic on or in man. Taxonomy of medically important arthropods stressed in laboratory. Prerequisite: Ento. 305 or equivalent.

**424. Insect Ecology. (2-3). Credit 3. II**

Effect of environmental factors upon distribution, abundance, competition, and ecological succession of insects. Prerequisite: Ento. 302 or equivalent.

**485. Problems. Credit 1 to 4. I, II, S**

Individual problems for beginners in research. Prerequisite: Approval of Department Head.

**FOR GRADUATES****601, 602. Systematic Entomology. (3-3). Credit 4 each semester. I, II**

Taxonomic study of orders and families, including genera and species of class Hexapoda; study of International Rules of Nomenclature. Special study of some particular group of insects required in practice. Prerequisite: Ento. 302.

**607. Economic Entomology. (3-3). Credit 4. I, S**

Designed primarily for workers in Vocational Agriculture and Extension Service. Biologies, economic importance and control of agricultural pests are stressed. Insecticides and methods of application. Prerequisite: Approval of Department Head.

**608. Economic Entomology. (3-3). Credit 4. II**

Detailed study of insect pests, including identification, distribution, principles, and methods of natural, cultural, and chemical controls. Literature and research methods stressed. Prerequisite: Ento. 401 or 402.

**613, 614. Morphology. (3-3). Credit 4 each semester. I, II**

Detailed study of anatomical structures of insects. Prerequisite: Ento. 305.

**615. Insect Physiology. (3-3). Credit 4. I**

Study of physiology of respiration, circulation, digestion, and excretion; mechanical and chemical senses of insects are considered. Prerequisite: Ento. 306 or equivalent.

**617, 618. Medical Entomology. (3-3). Credit 4 each semester. I, II**

Taxonomy and biology of parasitic insects, ticks, mites and their role in causation and transmission of diseases affecting man and domestic animals. Prerequisite: Ento. 208 or equivalent.

**619. Insect Toxicology. (3-3). Credit 4. II**

Chemical compounds which possess toxic properties; actions of poisons on insects;

evaluation of insecticides in laboratory and field; mathematical analysis of data. Prerequisite: Ento. 615.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Entomological problems not pertaining to thesis or dissertation. Prerequisites: Graduate classification with major or minor in entomology; approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Research problems on taxonomy, life histories, biological control, ecology, and physiology of insects, and toxicology of insecticides. Prerequisite: Graduate classification.

## Department of Geography

Professor Schlesselmann (Head); Associate Professor Doran

**201. World Regional Geography. (3-0). Credit 3. I, II**

Study of differences in physical and cultural environment over earth's surface, with emphasis on changes in landscape created by man.

**203. Physical Geography. (3-3). Credit 4. I, II**

Systematic description and interpretation of natural phenomena on face of earth.

**204. Economic Geography. (3-0). Credit 3. I, II**

Study of commercial regions of world, dealing with production types or occupations, such as grazing, plantation farming, grain farming, fishing, lumbering, mining, and manufacturing.

**302. Geography of Europe. (3-0). Credit 3. II**

Geographical survey of Europe as a whole and of individual countries.

**303. Geography of South America. (3-0). Credit 3. I**

Investigations of trade opportunities in South America. Economic activities of major geographic regions as reflecting present day utilization of natural resources. Possibilities of future development.

**304. Geography of South and East Asia. (3-0). Credit 3. II**

Geographic characteristics of Monsoon Asia. Topical discussion of such factors as physical landscape, cultural succession, and economies, followed by consideration of sub-regions.

**320. Geography of the Pacific Basin. (3-0). Credit 3. I**

Geographic aspects of Pacific Ocean area. Physical characteristics, native peoples, discovery and exploration, political and economic factors; regional studies of sub-areas.

**401. International Political Geography. (3-0). Credit 3. I**

Study of some of present social and political problems of world powers and also weaker nations. Effort to find geographic factors back of these problems and possible geographic adjustments.

**430. Cartography. (2-3). Credit 3. II**

Introduction to map making: history of maps and aerial photographs, projections, map lettering, compilation, design. Use of symbols. Prerequisite: Math. 102.

**440. History and Nature of Geography. (3-0). Credit 3. I**

Summary of classical knowledge of world, followed by sketch of geographic exploration to present. Emphasis on development of thought on nature of geography from 1800 to present.

**485. Problems. Credit 1 to 4. I, II**

Individually supervised research or advanced study on restricted areas not covered in regular courses. Prerequisite: Approval of Department Head.

## GRADUATES

**601. Economic Geography. (4-0). Credit 4. I**

Regional survey of world distribution of major agricultural and industrial commodities with particular attention to causal action of national, social, and economic factors. (Offered in 1965-66 and in alternate years thereafter.)

## Department of Geology and Geophysics

Professors Blank, Parker (Acting Head), Schroeder, Smith; Associate Professors Koenig, Seward; Assistant Professor Fahquist; Instructors Atwell, Keady

### GEOLOGY

**201. General Geology. (3-0). Credit 3. I, II**

Agents and processes that have produced surface features of earth and structure of earth's crust. Prerequisites: Chem. 101 or 103 or equivalent; registration in Geol. 203 or 207; registration in Geol. 209 for majors in geology, geophysics, and geological engineering.

**203. Crystallography and Mineralogy. (2-6). Credit 4. I**

Crystallography and descriptive mineralogy. Sight recognition of crystal forms and of common minerals. Prerequisites: Chem. 102 or 104; E.G. 106; Math. 102, 103.

**204. Mineralogy and Rock Study. (1-3). Credit 2. II, S**

Continuation of Geol. 203. Recognition and classification of common rocks by their megascopic characteristics. Prerequisite: Geol. 203.

**205. Elementary Geology. (3-3). Credit 4. I, II, S**

General principles of physical geology, physiography, geologic processes, and introduction to historical geology. Laboratory work on common minerals, rocks, and maps. Primarily for arts and science students.

**206. Elementary Historical Geology. (3-3). Credit 4. I, II**

Introduction to historical geology, including review of hypotheses of earth's origin, significance of fossils, origin and character of selected geologic formations, and development of North American continent. Prerequisite: Geol. 201, or 205, or 320.

**207. Mineralogy and Rock Study. (2-6). Credit 4. I**

Identification of common minerals and rocks by means of their physical properties. Study of well cuttings and cores. Should be taken simultaneously with Geol. 201. Designed for petroleum engineers. Prerequisites: Chem. 102 or 104; Math. 103 or equivalent.

**209. Introduction to Field Work. (0-3). Credit 1. I**

One-half day each week studying geologic processes. Scientific methods of field work stressed. Should be taken concurrently with Geol. 201 and cannot be taken for credit after credit is received for Geol. 210.

**210. Historical Geology. (3-3). Credit 4. II, S**

Principles of stratigraphy and paleontology, physical and organic record of earth's history, hypotheses of earth's origin. Prerequisites: Chem. 102 or 104; E.G. 106; Geol. 201 and 203, or 201 and 207, or 205 and approval of Department Head; Math. 102, 103.

**300. Field Geology. Credit 6. S**

Geologic mapping in selected areas in Llano Uplift and Marathon Basin. Written report. Prerequisites: C.E. 208; Geol. 204, 312, 317.

**303. Petrography and Petrology. (2-3). Credit 3. I**

Principles of optical mineralogy; identification of minerals in fragments and thin sections by use of petrographic microscope; thin section study of igneous rocks, and their classification. Prerequisite: Geol. 204.

**304. Sedimentary Petrography. (2-3). Credit 3. II**

Microscopic study of sedimentary and metamorphic rocks in thin sections; heavy mineral analysis; description, origin, and classification of sedimentary and metamorphic rocks. Prerequisite: Geol. 303.

**305. Invertebrate Paleontology. (3-3). Credit 4. I**

Morphology, classification, and geologic range of principal invertebrate groups. Prerequisite: Geol. 210.

**306. Stratigraphy. (3-3). Credit 4. II**

Stratigraphic studies of United States with emphasis on Gulf Coastal Plain formations and their correlation by means of invertebrate fossils. Laboratory studies consist of stratigraphic principles and changing faunas through geologic time. Prerequisite: Geol. 305.



**312. Structural Geology. (2-3). Credit 3. II**

Interpretation of rock structures; their relation to stratigraphic, physiographic, and economic problems. Prerequisites: Geol. 201, 204 or 207, 210.

**315. Principles of Sedimentation. (2-3). Credit 3. I**

Origin, transportation, and deposition of sediments; products resulting from sedimentary processes; structures, textures, and colors of sediments. Laboratory work in collecting and sampling, methods of analyzing and presenting data. Prerequisites: Geol. 201, 204, 210.

**317. Stratigraphic Paleontology. (0-3). Credit 1. II**

Laboratory studies of changes in faunas throughout geologic time. Prerequisite: Geol. 305.

**320. Geology for Civil Engineers. (2-3). Credit 3. I, II**

Principles of dynamic and structural geology and study of common minerals and rocks with their relationships and applications to construction, foundations, and excavation. Prerequisite: Sophomore classification in civil engineering.

**404. Geology of Petroleum. (2-3). Credit 3. I**

Origin, migration, and accumulation of petroleum. Typical United States oil and gas fields. Laboratory work in subsurface geology. Prerequisites: Geol. 300, 312.

**406. Economic Geology. (3-0). Credit 3. I**

Application of principles of geology, chemistry, and physics to formation of useful minerals and rocks and general survey of such deposits. Prerequisites: Geol. 300, 312.

**409. Geology of Non-Metallics Other than Petroleum. (3-0). Credit 3. II**

Mineralogy, stratigraphic, and structural relations, origin, geographic distribution, uses, and economics of non-metallic mineral deposits other than petroleum. Prerequisites: Geol. 300, 312.

**422. Natural Structural Materials. (2-3). Credit 3. II**

Building stones and stone products, with special emphasis on clays and clay products, their qualities, occurrences, uses, and processes of fabrication and manufacture. For students registered in architecture or engineering. Prerequisite: Junior classification.

**423. Micropaleontology. (1-6). Credit 3. II**

Systematic survey of important groups of micro-fauna with particular emphasis on their classification and use. Prerequisite: Geol. 305.

**425. Subsurface Geology. (2-3). Credit 3. II**

Study of well cuttings and cores; electrical, radioactive, drilling time, and caliper logs. Preparation of subsurface contour maps and cross sections. Prerequisites: Geol. 404; approval of Department Head.

**427. Stratigraphy. (3-0). Credit 3. II**

Stratigraphy of North America with emphasis on principles of stratigraphy. Prerequisite: Geol. 210.

**431. Geomorphology. (2-3). Credit 3. I**

Principles and fundamentals of geomorphology. Laboratory work in advanced map interpretation. Prerequisites: Geol. 300, 312.

**433. Field Geology. (0-6). Credit 2. II**

Two full afternoons per week devoted to acquirement of techniques of field geology in areas adjacent to campus. Prerequisite: Geol. 300.

**441. Advanced Engineering Geology. (3-3). Credit 4. I**

Survey of those phases of mineralogy, petrology, historical geology, structural geology, and sedimentation that may be applied to engineering problems. Not available to geology or petroleum engineering majors. Prerequisites: Senior classification; approval of Department Head.

**481. Seminar. (1-0). Credit 1. I**

Review of current literature and technical developments. Discussion of certain legal aspects of petroleum industry. Each student will make both oral and written reports. Prerequisites: Geol. 300, 312.

**482. Seminar. (1-0). Credit 1. II**

Continuation of Geol. 481. Each student will prepare more advanced reports. Prerequisites: Geol. 300, 306, 312.

**485. Problems. Credit 1 to 3. I, II, S**

Advanced problems in geology.

**599. Rocks and Minerals. (2-3). Credit 3. S**

Study of rocks and minerals and megascopic determination by means of their physical properties. Origins of minerals, rocks, and mineral deposits. For secondary school teachers. Prerequisites: Geol. 600; graduate classification; approval of Department Head.

**FOR GRADUATES****600. Earth Science for Secondary School Teachers. (2-3). Credit 3. II, S**

Survey of fundamental principles of physical geology, geologic processes, and earth history including origin and nature of solar system. Designed to aid secondary school instructors in presenting earth sciences. Prerequisites: Graduate classification; approval of Department Head.

**601. Advanced Research Techniques. (1-0). Credit 1. I**

Introduction to modern instrumentation techniques and methods used in geology. Prerequisite: Graduate classification.

**609. Field Geology. Credit 2 to 6. I, II, S**

Systematic geologic surveying of selected areas. Prerequisite: Geol. 300.

**612. Structural Geology. (3-0). Credit 3. I**

Detailed study of geologic structures and consideration of theories regarding earth movements, with selected readings. Prerequisite: Geol. 312.

**616. Micropaleontology. (1-6). Credit 3. I**

Study of microscopic fossils and their uses in correlation. Laboratory work in examination of well samples. Prerequisite: Geol. 423.

**618. Sedimentation. (3-0). Credit 3. II**

Investigation of processes of sedimentation with analytical laboratory work on sedimentary rocks. Seminar. Prerequisite: Geol. 315.

**619. Petroleum Geology. (3-0). Credit 3. II**

Theoretical study of some problems in petroleum geology. Prerequisite: Geol. 404.

**620. Geology of Ground Water. (3-0). Credit 3. I**

Principles of occurrence and movement of water beneath earth's surface, and influence of various geologic situations upon its behavior. Factors applying to estimates of supply. Engineering aspects of ground water.

**622. Stratigraphy. (3-0). Credit 3. I**

Sources and depositional environment of sediments, character and relation of sedimentary strata, and principles involved in delimiting, correlating and naming stratigraphic units.

**625. Advanced Ground Water Geology. (3-0). Credit 3. II**

Seminar course in application of principles of advanced geology to development and use of ground water supplies. Prerequisites: Geol. 620 or equivalent; approval of Department Head.

**627. Structural Geology of Foreign Areas. (2-0). Credit 2. II**

Reading and conference course on available literature dealing with basic geology of areas outside of North America.

**629. Structural Geology of North America. (3-0). Credit 3. II**

Description of important geologic structures of North America and of development of regional structural features in geological times. Prerequisite: Graduate classification.

**631. Geology in Engineering Construction. (3-0). Credit 3. II**

Geologic principles applied to construction of highways, foundations, bridge abutments, and piers, tunnels, dams, reservoirs, etc. Construction materials. Test borings and their interpretation. Prerequisites: Graduate classification; approval of instructor.

**639. Paleozoic and Mesozoic Paleontology. (3-0). Credit 3. I**

Study of important faunas of these eras. Prerequisites: Graduate classification; approval of Department Head.

**640. Cenozoic Paleontology. (3-0). Credit 3. II**

Study of important faunas of this era with emphasis on megafossils of Gulf Coast. Prerequisites: Graduate classification; approval of Department Head.

**643. Paleozoic Stratigraphy. (3-0). Credit 3. II**

Stratigraphy of Paleozoic System with particular emphasis on Paleozoic of West Texas and Oklahoma. Prerequisites: Graduate classification; approval of Department Head.

**644. Mesozoic Stratigraphy. (3-0). Credit 3. II**

Study of stratigraphy of Mesozoic System. Prerequisites: Graduate classification; approval of Department Head.

**645. Cenozoic Stratigraphy. (3-0). Credit 3. II**

Study of Cenozoic System. Prerequisites: Graduate classification; approval of Department Head.

**646. Gulf Coast Stratigraphy. (3-0). Credit 3. II**

Detailed study of Mesozoic and Cenozoic Systems of Gulf Embayment. Prerequisites: Graduate classification; approval of Department Head.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

A course to enable graduate students with major or minor in geology to undertake limited investigations not within their thesis or dissertation research and not covered in established curricula. Prerequisites: Graduate classification; approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Original research on problems in various phases of geology. Research for thesis or dissertation.

**GEOPHYSICS****435. Principles of Geophysical Exploration. (3-3). Credit 4. I**

Principles of different methods used in geophysical exploration with emphasis on interpretation of geophysical data and physical properties of rocks. Prerequisites: Geol. 312; Math. 122 or 210; Phys. 219; approval of Department Head for majors in other departments.

**436. Seismic Exploration. (2-3). Credit 3. II**

Study of seismic investigations with artificial sources, including field procedures, instrumentation, and interpretation of data. Prerequisite: Geol. 435.

**446. Physics of the Earth. (3-0). Credit 3. II**

Study of earth's elastic and inelastic behavior; its gravitational, magnetic, electrical and thermal fields; and effect of forces acting within earth. Prerequisites: Geol. 312; Math. 122 or 210; Phys. 219; approval of Department Head for majors in other departments.

**485. Problems. Credit 1 to 3. I, II, S**

Advanced problems in geophysics.

**FOR GRADUATES****651. Theoretical Seismology. (3-0). Credit 3. I**

Mathematical development of elasticity theory and stress waves in bounded and unbounded solid media. Prerequisites: Geop. 435 or registration therein; Math. 308; approval of Department Head for majors in other departments.

**653. Gravity and Magnetic Methods. (3-0). Credit 3. II**

Study of earth's gravity and magnetic fields; role of gravity in geodesy; methods, instruments, and interpretation of data in gravity and magnetic methods of exploration. Prerequisites: Geop. 435; Math. 308.

**655. Electrical and Radioactivity Methods. (2-0). Credit 2. II**

Study of procedures, instruments, and interpretation of data obtained from electrical, electromagnetic, and radioactivity methods of exploration. Minor emphasis on



geothermal and geochemical methods. Prerequisites: Geop. 435; Math. 308 or registration therein.

**657. Earthquake Seismology. (2-0). Credit 2. I**

Study of earthquakes, their causes, effects, method of location, determination of wave paths, interpretation of deep structures; and instruments used for recording. Prerequisite: Geop. 651 or registration therein.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

A course to enable graduate students with major or minor in geophysics to undertake limited investigations not within their thesis or dissertation research and not covered in established curricula. Prerequisites: Graduate classification; approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Original research on problems in various phases of geophysics. Research for thesis or dissertation.

## Department of Health and Physical Education

Professors Adamson, Dowell<sup>1</sup>, Landiss, Tishler (Head), Penberthy; Associate Professors Andrews, Mamaliga, Palmer, Ponthieux; Assistant Professor Wieder; Instructor Stephens

### HEALTH EDUCATION

**216. First Aid. (0-3). Credit 1. I, II, S**

Prepares students for Red Cross Instructor's First Aid Certificate.

**218. Athletic Injuries. (1-3). Credit 2. II**

Study of conditioning and training of individual and team; care and prevention of injuries. Prerequisite: Biol. 219.

**415. Secondary School Health Education. (3-0). Credit 3. I, S**

Study of health problems; needs of individual; cooperation of home and community; resources for health in community, state, and nation; techniques of evaluation. Prerequisite: Approval of instructor.

**421. Elementary School Health Education. (3-0). Credit 3. II**

Study of modern trends and methods in elementary school health program; survey of materials and agencies and their value to adequate health program. Prerequisite: Approval of instructor.

### FOR GRADUATES

**631. Community and Public Health. (3-0). Credit 3. S**

Community health problems; public health laws; national, state, and local health agencies. Prerequisite: H.E. 415 or 421.

### PHYSICAL EDUCATION

P.E. 101, 102, 201, and 202 are included in all curricula. The purpose of the physical education program is to raise the level of fitness of the student and help him acquire through instruction and practice the fundamental knowledges and skills to meet present and future physical needs.

All students will be classified according to their specific needs and assigned to courses of instruction based on these needs. All students will be administered a swimming test and a physical fitness test. Those students who are unable to pass the swimming test will register for swimming instruction. Students who do not meet the minimum standards of fitness will register for a general conditioning course, while those students who do not meet the optimum standards of fitness will register for instruction in a developmental course. All other students who meet, or surpass, the optimum standards may register for any one of the P.E. 101, 102, 201, and 202 courses. No student may repeat a course unless he has failed it.

Students may elect P.E. 301, 302 for credit of one hour each after having completed the required courses.

<sup>1</sup>Deceased January 30, 1965.

101. Required Physical Education. (0-2). No Credit. I, II, S

102. Required Physical Education. (0-2). No Credit. I, II, S

201. Required Physical Education. (0-2). No Credit. I, II, S

202. Required Physical Education. (0-2). No Credit. I, II, S

210. Life Saving and Pool Management. (1-3). Credit 2. II

Designed to qualify students for Red Cross Senior Life Saving and Instructor's certificates; includes study of sanitary codes and pool sanitation, problems of pool and waterfront management; selection of personnel.

211. Physical Education Activities. (1-3). Credit 2. I

Instruction and development of skill in physical education activities with emphasis on team type activities other than major sports.

212. Physical Education Activities. (1-3). Credit 2. II

Instruction and development of skill in physical education activities with emphasis on individual and dual type sports.

213. Introduction to Health and Physical Education. (3-0). Credit 3. I, II

History; principles; objectives; current concepts of health, physical education, and recreation.

221. Safety Education. (2-0). Credit 2. I

Home, school, traffic, and general safety.

251. Coaching of Basketball. (1-3). Credit 2. I

Theory and practice of coaching fundamentals in basketball.

255. Coaching of Track. (1-3). Credit 2. I

Theory and practice of coaching fundamentals in track and field events.

301. Physical Education. (0-2). Credit 1. I, II, S

May be elected by students having completed four required semesters of physical education.

302. Physical Education. (0-2). Credit 1. I, II, S

May be elected by students having completed four required semesters of physical education.

315. Elementary School Physical Education. (3-0). Credit 3. II

Physical education activities, materials, and curriculum in elementary schools. Prerequisite: Junior classification.

316. Secondary School Physical Education. (3-0). Credit 3. I

Physical education activities, materials, and curriculum in secondary schools. Prerequisite: Junior classification.

317. Coaching of Football. (1-3). Credit 2. II

Theory and practice of coaching fundamentals in football.

423. Administration of Health and Physical Education. (3-0). Credit 3. II, S

Administrative problems involved in coordination of health, physical education, intramural, and athletic areas in comprehensive program of physical education. Prerequisite: Senior classification.

425. Tests and Measurements. (3-0). Credit 3. I, II, S

Use, interpretation, evaluation, and administration of existing tests in health and physical education; application of elementary statistical procedures. Prerequisite: Senior classification.

427. Therapeutic Principles. (3-0). Credit 3. I

Elementary techniques in diagnosing functional and structural defects; procedures of individual exercise with emphasis on preventive and remedial measures. Prerequisite: Biol. 219.

428. Corrective Therapy. (3-9). Credit 6. II, S

A six week clinical course in corrective therapy. Taught at, and in cooperation with, the Veterans Administration Hospital in Houston. Prerequisite: P.E. 427.

**450. Directed Teaching. (2-12). Credit 6. I, II**

Observation and supervised practice teaching in public schools. Prerequisites: P.E. 316; senior classification.

**481. Seminar. (1-0). Credit 1. I, II, S**

Study of professional ethics and current problems relating to health, physical education, and athletics. Prerequisite: Senior classification.

**485. Problems. Credit 1 to 3.**

Special problems in physical education assigned to individual students or to groups.

**FOR GRADUATES****601. Survey of Research. (3-0). Credit 3. S**

Study of published reports and research in field of health and physical education. Prerequisite: Educ. 426 or P.E. 425.

**603. Coaching and Officiating. (3-0). Credit 3. S**

Advanced coaching and officiating techniques in football, basketball, track, and baseball. Prerequisites: Teaching and coaching experience.

**610. Administration of Interschool Athletics. (2-0). Credit 2. S**

Designed for school superintendents, principals, and athletic directors. Study of various problems in administration of interschool athletic program.

**614. Philosophy and Principles. (3-0). Credit 3. S**

Divergent origins, leaders, conditions, and forces affecting development of health and physical education.

**622. Supervision of Health and Physical Education. (3-0). Credit 3. S**

Principles and processes of supervision; in-service training of personnel. Prerequisite: P.E. 423.

**636. Advanced Tests and Measurements. (3-0). Credit 3. S**

Critical study of tests and measurements; methods of constructing and evaluating tests. Prerequisite: P.E. 425.

**681. Seminar. (1-0). Credit 1. I, II, S**

Discussions of laws, certification, professional ethics, and other current problems relating to health, physical education, and recreation.

**685. Problems. Credit 1 to 3 each semester. I, II, S**

Directed study of selected problems of health, physical education, and recreation not related to thesis.

**Department of History and Government**

Professors Benton, Hall, Nance (Head), Nelson; Associate Professors Duncan, Lang, Miller, Taylor; Assistant Professors Ashcraft, Bayliss, Botner, Ford, Hepburn, Monroe, Stephens; Instructors Anderson, Francis, Heslop, Kyriakides, Little, Treat

**GOVERNMENT****206. American National Government. (3-0). Credit 3. I, II, S**

Organization, functions, and nature of national government; rights, privileges, and obligations of citizenship; immigration and naturalization laws, all as closely related to constitution of United States as possible. Prerequisite: Sophomore classification.

**207. State and Local Government. (3-0). Credit 3. I, II, S**

Nature, organization, and general principles of local government in United States with especial attention to these forms of government in Texas. Prerequisite: Govt. 206 or equivalent. Required of all students who have not had at least three semester hours credit in military training.

**308. United States Constitutional Development. (3-0). Credit 3. II**

Study of leading decisions of Supreme Court. Various trends in our constitutional growth since 1789 are treated, as well as expansion through judicial interpretation of powers delegated to national government. Prerequisites: Govt. 206; Hist. 105.



**310. Comparative Government. (3-0). Credit 3. II, S**

Survey of major European governments. Stress placed upon parliamentary democracies of Great Britain, France, West Germany, and Italy. Dictatorships of U.S.S.R. and Spain will also be considered. Prerequisite: Junior classification.

**315. American Political Parties. (3-0). Credit 3. I, S**

Study of organization, history, and functions of political parties, and place they occupy in operation of national, state, and local governments in United States. Prerequisite: Junior classification. (Offered in 1965-66 and in alternate years thereafter.)

**320. Elements of Political Thought. (3-0). Credit 3. II**

Study of ancient, medieval, and modern concepts of government as developed by principal contemporary political writers, and as reflected in political institutions. Prerequisite: Junior classification. (Offered in 1965-66 and in alternate years thereafter.)

**321. Local Government in the United States. (3-0). Credit 3. II**

Development, structure, nature, and legal status of local government pattern; countries, towns, townships, school districts, etc., their relationship to the units of government. Prerequisites: Govt. 206, 207. (Offered in 1965-66 and in alternate years thereafter.)

**325. Introduction to Public Administration. (3-0). Credit 3. I**

Survey of American public administration with emphasis upon development of public administration in United States, theories of organization, methods of management, executive leadership, ethics and responsibility. Prerequisites: Govt. 206, 207.

**331. International Politics. (3-0). Credit 3. I**

Analysis of contemporary world from point of view of nation-state; political principles, problems, and factors involved in foreign policies, and relations of nations. Prerequisite: Six semester hours of government. (Offered in 1966-67 and in alternate years thereafter.)

**333. International and Regional Organization. (3-0). Credit 3. II**

Historical development of modern world-wide regional international organizations. Politics, structure, and functions of United Nations; economic and political; international federalism. Prerequisites: Govt. 206, 207. (Offered in 1966-67 and in alternate years thereafter.)

**335. Government and Politics of Latin America. (3-0). Credit 3. I**

Constitutional development, political institutions, and contemporary political problems of principal Latin American countries. Prerequisite: Six hours of government. (Offered in 1965-66 and in alternate years thereafter.)

**425. American Political Thought. (3-0). Credit 3. I, S**

Study of ideas that have shaped American political thought from colonial times to present as reflected in their institutions, political writers, statesmen, and other individuals. Prerequisite: Six hours of advanced government or approval of Department Head.

**431. Conduct and Control of American Foreign Relations. (3-0). Credit 3. I, S**

Nature and control of power to conduct foreign relations under Constitution; treaties, agreements, and war. Role of Foreign Service of State Department: nature, structure, and functions of diplomatic and consular services. Prerequisites: Twelve semester hours of government or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**436. Municipal Government. (3-0). Credit 3. I**

Urban growth; legal position of cities; forms of government; relation of city to state; special reference to Texas cities. Prerequisite: Govt. 206. (Offered in 1966-67 and in alternate years thereafter.)

**438. American Legislative Process. (3-0). Credit 3. I, S**

Analysis of legislative process; powers, structure, organization, political control, and procedure of Congress and state legislatures; other legislative authorities. Prerequisites: Govt. 206, 207. (Offered in 1965-66 and in alternate years thereafter.)

**441. Public Personnel Administration. (3-0). Credit 3. II**

Development of merit system; problems of recruitment and selection; position classification and compensation; promotion, discipline, service ratings; retirement; selected cases in personnel management. Prerequisite: Six semester hours of advanced government.

**FOR GRADUATES****611. Government of the Soviet Union and Eastern Europe. (3-0). Credit 3. II, S**

Nature and structure of Soviet political institutions; communist ideology; Russian imperialism and international Communism; the "cold war." Prerequisites: Twelve semester hours of advanced government or equivalent.

**632. International Law. (3-0). Credit 3. I, S**

Nature and sources of international law; recognition; jurisdiction on high seas; rights and immunities of states and persons in foreign courts; law of international claims; law of war and neutrality. Prerequisites: Twelve semester hours of advanced government.

**685. Problems. Credit 1 to 3. I, II, S**

Individual instruction in selected fields of government. Will stress reports and wide reading in field selected. Prerequisites: Eighteen hours of government and history; graduate classification.

**691. Research. Credit 1 or more each semester. I, II, S**

Thesis research. Credit will be given only upon acceptance of completed thesis. Prerequisites: Twelve hours of advanced government.

**HISTORY****101. History of Western Civilization to 1500. (3-0). Credit 3. I**

Ancient civilization, Greece and Rome; Christianity; Medieval civilization in West, eastern Europe; emphasis upon political, social, and intellectual developments from earliest human cultures to 1500. Prerequisite: Registration in Honors Program.

**102. History of Western Civilization since 1500. (3-0). Credit 3. II**

Renaissance and Reformation; religious, dynastic, and imperial developments; industrial revolution; western democracies; central and eastern Europe; intellectual revolution; World Wars I and II and after. Prerequisites: Hist. 101 or 217; registration in Honors Program.

**105. History of the United States. (3-0). Credit 3. I, II, S**

English colonization; Revolution; adoption of constitution; growth of nationalism; cotton and slavery problem; war for Southern independence; reconstruction. (See "Requirement in Government and History," page 62.)

**106. History of the United States. (3-0). Credit 3. I, II, S**

Since reconstruction; new social and industrial problems; rise of progressive movement; United States emergence as world power; World War I; reaction and New Deal; World War II; contemporary America. Prerequisite: Hist. 105.

**205. American History, 1492-1875. (3-0). Credit 3. I**

The origins and growth of United States; survey of American social, political, economic development. Prerequisites: Sophomore classification; registration in Honors Program.

**206. American History, 1876 to the Present. (3-0). Credit 3. II**

Survey of social, political, and economic development of United States since 1875. Prerequisites: Hist. 105 or 205; registration in Honors Program.

**213. History of England. (3-0). Credit 3. I, II**

British, Saxon, and Norman origins; national development; struggles between church and state; crown and nobles; nobles and commons; development of parliament. Required in three-year pre-law program.

**214. History of England. (3-0). Credit 3. I, II**

Agrarian and Industrial Revolutions; relations with Ireland; evolution of democracy; struggles with France and Napoleon; social legislation in twentieth century;

growth of Empire until World War II. Required in three-year pre-law program. Prerequisite: Hist. 213.

**217. Development of Europe. (3-0). Credit 3. I, II, S**

History of western Europe and Middle Ages. Survey of development of European civilization from decline of Roman Empire to Renaissance. Required of majors in history.

**218. Development of Europe. (3-0). Credit 3. I, II, S**

History of western Europe from Renaissance to present. Required of majors in history. Prerequisite: Hist. 217.

**302. Colonization of North America. (3-0). Credit 3. II**

Geographic setting; early English, French, Dutch, Swedish discovery, conquest, and settlement, 1497-1763; colonial administration; colonial life; inter-colonial wars. Prerequisite: Twelve hours of history, or six hours of history and at least six hours of sophomore courses in other social sciences.

**315. The United States, 1901 to the Present. (3-0). Credit 3. I, II, S**

Study of United States history during twentieth century with particular emphasis upon domestic matters.

**318. International Developments since 1918. (3-0). Credit 3. I, II, S**

General survey of world politics since close of World War I. Particular attention given to problems and ideologies of great powers of Europe and to those factors and conditions which explain present political tendencies and policies.

**321. Europe, 1815-1870. (3-0). Credit 3. I**

Congress of Vienna and reconstruction of Europe; political changes in 1823, 1830, 1848, and 1870; outstanding social, economic, scientific, and cultural developments. Prerequisites: Twelve semester hours of history, or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**322. Europe, 1870-1919. (3-0). Credit 3. II**

Political, economic, social, intellectual, and cultural developments in Europe, 1870-1919, with special emphasis upon diplomatic and military developments. Prerequisites: Twelve semester hours of history, or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**325. Trends in American History. (3-0). Credit 3. I, II, S**

Sources and development of leading American institutions constituting representative democracy, their influence upon our nation's development and upon twentieth century world. Required of all students offering only three semester hours in American history toward legal requirement for baccalaureate degree.

**326. History of Texas. (3-0). Credit 3. I, II, S**

History of Texas from Spanish period to present day. Stress placed upon period of Anglo-American settlement, revolution, republic, and development of modern state. Prerequisite: Sophomore classification.

**331. Medieval Civilization. (3-0). Credit 3. I**

History of medieval thought ranging from influence of Plato and Aristotle to age of Erasmus and Machiavelli; intellectual history of Middle Ages, including interests of man in philosophy, science, education, law, and religion. Prerequisite: Six semester hours of history.

**332. Renaissance and Reformation. (3-0). Credit 3. II**

Study of fifteenth and sixteenth centuries with emphasis upon political ideas, art, and humanism of Renaissance. Doctrinal controversy and beliefs of Luther, Calvin, and Zwingli are emphasized. Prerequisite: Six semester hours of history.

**341. South America to 1825. (3-0). Credit 3. I**

Political history of South America from exploration and settlement to independence; colonial institutions; commercial systems. Prerequisites: Twelve semester hours of history, or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**342. South America Since Independence. (3-0). Credit 3. II**

Political history of independent South American nations since independence with emphasis upon ABC countries; economic, social, and cultural development; foreign



relations. Prerequisites: Twelve semester hours of history, or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**375. Tudor and Stuart England. (3-0). Credit 3. I, S**

Study of changes in social, economic, political, and religious organization of England from 1485 to 1689; the Interregnum, Restoration, and "Glorious Revolution." Prerequisites: Twelve hours in history, including Hist. 213, 214 or 217, 218. (Offered in 1966-67 and in alternate years thereafter.)

**410. The United States, 1820-1860. (3-0). Credit 3. I, S**

Jacksonian democracy; impact of nationalism and sectionalism; manifest destiny and Mexican War; slavery controversy; expansion. Prerequisite: Six hours of advanced history or approval of Department Head. (Offered in 1965-66 and in alternate years thereafter.)

**411. The Old South. (3-0). Credit 3. I, S**

History of antebellum South; emphasis upon physical bases of Southern regionalism; Southern alignments on national issues; slavery-plantation economy and society of Old South; secession and formation of Confederacy. Prerequisite: Hist. 106 or 325.

**412. Civil War and Reconstruction. (3-0). Credit 3. II**

Survey of background and causes of the war; military, political, economic, and diplomatic aspects of the war; life behind the lines; reconstruction and post-war adjustments, 1861-1877. Prerequisite: Twelve hours of history, or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**413. Mexico and Spanish North America, 1492-1821. (3-0). Credit 3. I**

Exploration and establishment of Spanish dominion in West Indies, Central America, and Mexico; Spanish colonial system and institutional development; independence movement. Prerequisites: Twelve semester hours of history, or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**414. History of Mexico, 1821 to the Present. (3-0). Credit 3. II**

Political, economic, and social development of Mexico since independence and her relation to other world powers. Prerequisites: Twelve semester hours of history, or 6 hours of history and junior classification. (Offered in 1965-66 and in alternate years thereafter.)

**415. The Institutional Background of Texas, 1519-1845. (3-0). Credit 3. I, S**

Study of history of Texas from Spanish period to annexation to United States. Particular stress placed upon Spanish and Mexican legal and administrative systems, colonization; revolution, republic, and fight for annexation. (Offered in 1965-66 and in alternate years thereafter.)

**416. Texas Since 1845. (3-0). Credit 3. II, S**

History of Texas since annexation. Careful attention given to social, cultural, economic, and political developments, and to place of Texas in national affairs. (Offered in 1965-66 and in alternate years thereafter.)

**419. Social and Intellectual History of the United States, 1820-1920. (3-0). Credit 3. II**

Century of social and political thought, religion, science, scholarship, and education in United States. Prerequisite: Six hours of advanced history or approval of Department Head. (Offered in 1966-67 and alternate years thereafter.)

**421. Far East, 1895 to Present. (3-0). Credit 3. II**

Survey of government, politics, and civilizations of China, Japan, India, Pakistan, and Southeast Asia since 1895; international developments in Far East; Korean War. Prerequisite: Twelve hours of history, or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**422. International Rivalry in the Gulf-Caribbean Area, 1840 to the Present. (3-0). Credit 3. I**

Background of Spanish colonial policies, with British, French, and Dutch intrusion; United States interest and policies; Pan-Americanism and Pan-Hispanism. (Offered in 1965-66 and in alternate years thereafter.)

**423. American Foreign Relations. (3-0). Credit 3. I, S**

History of United States foreign relations and policies to 1868. (Offered in 1966-67 and in alternate years thereafter.)

**424. American Foreign Relations. (3-0). Credit 3. II, S**

History of United States foreign relations and policies since 1868. (Offered in 1966-67 and in alternate years thereafter.)

**475. Nineteenth Century England. (3-0). Credit 3. II**

Political, social, economic, and intellectual history of England from 1815 to 1914. Prerequisite: Six hours of advanced history or approval of Department Head.

**485. Problems. (3-0). Credit 3. I, II**

Seminar instruction in selected fields of history not covered in depth by other courses. Reports, extensive reading, and comprehensive final examination required. Prerequisites: Superior GPR; 18 hours of history, 6 of which must be advanced; approval of Department Head.

**FOR GRADUATES****607. The United States, 1763-1800. (3-0). Credit 3. I, S**

Study of causes of American Revolution, the Revolution, Articles of Confederation, and final union under Constitution. Careful attention given economic and social developments as well as political developments. Prerequisite: Eighteen hours of history and government.

**609. American Historical Writing. (3-0). Credit 3. I, S**

Survey of American historical writing and historiography from 1607 to present, with some attention to bibliographical guides to sources and literature of United States. Prerequisites: Twelve hours of advanced history or equivalent.

**610. The Trans-Mississippi West. (3-0). Credit 3. II**

Study of the West in American history. Emphasizes political, economics, social, and cultural influences of frontier. Extensive reading required. Prerequisites: Eighteen hours of history and government.

**611. American Leaders. (3-0). Credit 3. II, S**

Personalities and contributions of thirty-six American leaders from Samuel Adams to Dwight Eisenhower. Prerequisite: Twelve hours of advanced history or equivalent.

**612. The French Revolution and Napoleon. (3-0). Credit 3. II**

Detailed consideration of decline of ancient regime, influence of Encyclopedists, causes and course of events during revolution and after; evaluation of source material. Prerequisite: Eighteen hours of history and government. (Offered in 1965-66 and in alternate years thereafter.)

**615. Growth of Spanish Institutions in America, 1492-1857. (3-0). Credit 3. I**

Study of political, economic, religious, military, and related institutions, both in theory and practice, as proposed, developed, and applied in Spanish-American colonies and nations. Prerequisite: Eighteen hours of history and government. (Offered in 1966-67 and in alternate years thereafter.)

**685. Problems. Credit 1 to 3 each semester. I, II, S**

Individual instruction in selected fields of history. Stresses reports and wide reading in field selected. Prerequisite: Eighteen hours of history and government.

**691. Research. Credit 1 or more each semester. I, II, S**

Thesis research. Credit given only upon acceptance of completed thesis. Prerequisite: Twelve hours of advanced history.

**Department of Industrial Education**

Professors Groneman (Head), Hawkins; Associate Professors Glazener, Hardeman; Assistant Professors Bertrand, Boone; Instructors Craft, Dennis, Magowan, Zabcik

**105. Woodcraft. (1-5). Credit 3. I, II**

Comprehensive study of woods, wood products, and wood industries; including growth and botanical structure, production and uses, design, construction, and finishing.

**106. Sheet Metal. (1-5). Credit 3. II**

Study of industrial practices in developing, laying-out, and fabricating sheet metal products. Problems involving parallel-line, radial-line, and triangulation.

**107. Industrial Materials and Manufacturing Processes. (2-3). Credit 3. I, II**

Comprehensive study of production, processing, and use of numerous raw materials of industry. Laboratory work consists of problems involving research and experimentation.

**108. Carpentry and Mill Work. (1-6). Credit 3. I, II**

Designed for freshman architectural students. Includes simple construction such as framing, roof construction, general carpentry, finishing, forms, working drawings, and mill work including use of machines, hand tools, safety, and built-in cabinet construction in home.

**109. Cabinet Making. (1-6). Credit 3. II**

Design, construction, and finishing of furniture; glues, varnishes, lacquers, and other finishing materials; production methods; care and maintenance of wood-working machinery.

**204. Development and Practice in Industrial Education. (3-0). Credit 3. II**

History and development of industrial education, its meaning and objectives. Applications of vocational preparation for industry, vocational practices, and developments within industry.

**205. Ornamental Iron. (1-5). Credit 3. I**

Study of metals and metal products; including alloying and proper use of ferrous and non-ferrous metals. Problems involving casting, spinning, machining, forging, welding, tubular construction, and electroplating required.

**301. Methods of Teaching and Class Management. (2-0) or (3-0). Credit 2 or 3. I**

Introduction to fundamentals of teaching as applied to industrial subjects; management of class, equipment, and supplies.

**304. Applied Industrial Electricity. (2-3). Credit 3. I, II**

Theoretical and practical study of electrical circuits, motors, generators, transformers, lighting, controls, and instruments. Laboratory experiences consist of experiments and projects in circuits and machines. Prerequisite: Phys. 202.

**308. A Study of Modern Industries. (3-0). Credit 3. I**

Study of political, historical, and geographical factors, including location, machinery, power, raw material, market, and labor which have direct influence upon development and distribution of industries. Specific studies of individual industries are made, such as iron, steel, paper, automobiles, petroleum, cement, leather, plastics, and textiles.

**310. Course Making. (2-0). Credit 2. II**

Methods of outlining courses of study to meet needs of different types of classes. Each student will make a complete course for some particular subject.

**323. Methods of Teaching Mechanical Drawing. (1-3). Credit 2. I**

Student should have completed course equivalent to E.G. 106 before attempting this course. Analysis of problems and selection of instructional material and methods of presentation for general drafting.

**326. General Metalwork. (1-5). Credit 3. I, II**

Designing and construction of power machinery including development of plans for procedure, jigs, and fixtures. Study made of materials and industrial processes and procedures of foundry, welding, and machine shop. Prerequisites: M.E. 202, 310.

**327. Industrial Arts Handcraft. (1-5). Credit 3. I**

Development and preparation of instructional materials; designing and building of teaching type projects and problems in such materials as leather, bookbinding, lapidary, and other handcraft activities. Prerequisite: Nine hours of industrial laboratory courses.

**328. Industrial Accident Prevention. (3-0). Credit 3. I, II**

Analysis of fundamentals of accident prevention and their application to industrial supervision and management. Prerequisite: Junior classification.

**329. Advanced Cabinet Making. (1-6). Credit 3. II**

Cabinet and furniture design, estimating, detailing, construction, and finishing.



Construct major project from detail drawings made by student. Term paper required on some related subject. Prerequisite: I.Ed. 108 or 109, or equivalent experience.

**332. Plastics and Ceramics. (1-3). Credit 2. I**

Sources, manufacture, supply, and uses of plastics and ceramic materials; designs appropriate for plastic projects; essential processes in fabrication of plastics and ceramic objects. Prerequisite: Nine hours of industrial laboratory courses.

**334. Upholstery. (1-3). Credit 2. II**

Instruction in essentials of upholstery processes, including design and construction of frames and foundations. Prerequisite: I.Ed. 105.

**336. Design in the Arts and Crafts. (1-3). Credit 2. II**

Analysis and solution of design problems applicable to arts, crafts, and industrial products as related to industrial education. Prerequisites: E.G. 105, 127; I.Ed. 105, 109; M.E. 202, 309.

**404. Visual Aids for Industrial Subjects. (1-2). Credit 2. I**

Designed to develop understanding of, need for, construction of, and use of visual aids for instruction in industrial subjects. Student activity consists of determining values of color in aids, use of projection and television equipment, and variety of other audio-visual media.

**406. Industrial Guidance. (2-0). Credit 2. I**

Study of instruments and techniques of industrial guidance, its relation to education and industry, its meaning and purpose, and analysis of methods of investigation and guidance procedures.

**409. Methods of Introducing Industrial Organization and Management into Industrial Schools. (2-0). Credit 2. S**

Management of modern industrial enterprises and possible adaptation to industrial schools.

**419. Laboratory of Industries Methods. (1-3). Credit 2. II**

Study of industries, with particular emphasis on graphic arts. Student experimentation with methods of communicating through media of type, engravings, lithography, and xerography. Laboratory work in plate-making, proofreading, copy-fitting, make-up and fundamentals of layout.

**420. Follow-Up, Visitations, and Coordination in Part-Time Schools. (2-0). Credit 2. S**

Selecting occupations suitable for young people to learn, placing students in suitable employment on part-time basis, and coordinating their school duties with their work activities.

**423. Analysis Procedure. (1-2). Credit 2. I, II**

Analysis made of occupations to obtain content for instructional information. Jobs and operations studied to determine order and content of operation, job description, job evaluation, and job safety.

**424. Organization of Instructional Material. (1-2). Credit 2. S**

Study will be made of published material available in student's occupational field. Those parts found suitable for industrial classes will be indexed and organized for class use. Types of instruction sheets found necessary for efficient teaching will be written.

**427. Driver Education. (1-6). Credit 3. II**

Study and application of state and federal regulations and policies governing efficient and safe operation of automotive vehicles in traffic.

**429. Foremanship and Supervision. (3-0). Credit 3. I**

Study of supervisory duties and responsibilities in industrial organization and procedures for meeting these responsibilities. Prerequisite: Senior classification.

**438. Industrial Safety. (2-3). Credit 3. II**

Continuation of I.Ed. 328. Includes analyses of accidents; organizations and programs of industrial safety departments; control of hazards, and application of safety engineering principles in design and specifications. Prerequisites: I.Ed. 328; I.En. 302; and either I.Ed. 429 or I.En. 401 or registration therein.

**442. Supervised Teaching in Industrial Arts. (2-12). Credit 6. I, II**

Observation of, and participation in, activities of typical industrial arts classroom. Student prepares lesson plans and presents demonstrations to pupils in industrial arts in public schools. Prerequisites: I.Ed. 204, 301; senior classification.

**444. Industrial Distribution. (3-0). Credit 3. I, II**

Seminar approach to study of problems of industrial distribution with assistance of representative from industrial distributor organizations. Prerequisite: Junior classification.

**447. Electricity and Electronics. (2-3). Credit 3. I, II**

Continuation of I.Ed. 304. Laboratory experiences in construction and operation of electronic devices, including power supplies, receivers, amplifiers, and electronic controls. Prerequisite: I.Ed. 304.

**481. Seminar in Industrial Education. (1-0). Credit 1. I, II**

General discussion of laws, legislation, certification, professional ethics, and other current problems relating to industrial and teaching fields. Prerequisite: Senior classification.

**FOR GRADUATES****601. History of Industrial Education. (2-0). Credit 2. I, II, S**

Study of leaders, movements, and agencies with special emphasis on economic, social, and philosophical factors which have contributed to development of industrial education in the United States.

**602. Industrial Arts Administration and Supervision. (2-0). Credit 2. I, II, S**

Problems of local director or supervisor of industrial arts.

**603. Administration and Supervision of Vocational Industrial Education. (2-0). Credit 2. I, II, S**

Problems of local director or supervisor of vocational industrial education.

**604. Industrial Programs for Junior Colleges and Technical Schools. (2-0). Credit 2. I, II, S**

Study of kinds, purpose, size, accreditation, growth, and teaching problems in junior colleges, technical institutes, and adult schools, with particular emphasis on organization and presentation of industrial subject material in these schools.

**605. Problems in Industrial Safety. (2-0). Credit 2. I, II, S**

Basic reasons for accidents; prevention of industrial accidents; qualifications and duties of safety consultants; methods of making investigations; making investigations and how to prepare safety reports.

**606. Organization of Industrial Arts Department. (2-0). Credit 2. I, II, S**

Problems in determining type and size of industrial arts programs for various types and sizes of schools with plans for organization of each.

**609. Methods of Teaching High School Drawing. (2-3). Credit 3. I, II, S**

Survey of field of drawing. Designing and organizing of problems and teaching devices.

**614. Guidance Seminar. (2-0). Credit 2. I, II, S**

Organization of occupational information; educational and vocational guidance; counseling case problems. Prerequisite: I.Ed. 406 or equivalent.

**616. Methods of Teaching Industrial Arts in Secondary Schools. (2-0). Credit 2. I, II, S**

Selecting and organizing instructional material for problems in a particular industrial activity.

**618. Tests and Measurements in Industrial Education. (2-0). Credit 2. I, II, S**

Study of testing and measuring devices and their application to industrial education subjects.

**619. Related Subjects in Part-Time Cooperative Programs. (2-0). Credit 2. I, II, S**

Organization and presentation of content material necessary in part-time cooperative programs, and direction of the study of students engaged in such programs.

**621. Philosophy of Vocational Education. (2-0). Credit 2. I, II, S**

Basic principles involved in development and operation of industrial education programs under State and Federal vocational laws.

**622. Philosophy of Industrial Arts Education. (2-0). Credit 2. I, II, S**

Principles involved in development and operation of industrial arts courses and their purpose and function in the field of general education.

**623. Vocational Guidance Procedures. (3-0). Credit 3. I, II, S**

Workshop approach to study of vocational guidance, programs, relationships, group techniques, and methodology of clinical approach.

**626. Classroom Management and Shop Organization. (2-0). Credit 2. I, II, S**

Organization of procedures to facilitate teaching; setting up roll-checking devices, issuing procedures for tools and materials, keeping material inventory, using assignment and progress charts, using student leadership in routine non-teaching class and laboratory routine, and keeping records.

**627. Teacher Training for Local Supervisors of Trade and Industrial Classes. (2-0). Credit 2. S**

Discussion of problems related to administration of industrial education programs, in-service training, and upgrading of programs on local level. Methods of organizing and conducting teacher improvement programs, including methods of conducting organized research.

**628. Organization of Vocational Industrial Schools and Classes. (2-0). Credit 2. S**

Methods of making surveys, determining needs for various industrial education programs, and organization of curriculum and classes according to State certification requirements.

**630. Auto Mechanics. (1-4). Credit 2. I, II, S**

Development and preparation of instructional materials and testing of laboratory problems pertaining to economic selection, operation, and maintenance of internal combustion engines, power transmission systems, and automated control systems.

**631. Electricity. (1-4). Credit 2. I, II, S**

Development and preparation of instructional materials for use by electricity and electronics teachers in industrial arts, vocational and technical education programs.

**632. Cabinet Making. (1-4). Credit 2. I, II, S**

Development and preparation of instructional materials and testing of laboratory problems pertaining to modern methods of kiln drying, veneer construction, upholstery, and fabrication within the furniture industry.

**633. Machine Shop. (1-4). Credit 2. I, II, S**

Development and preparation of instructional materials and testing of laboratory problems pertaining to modern practices and problems in teaching of advanced machine shop.

**634. Ornamental Metal Work. (1-4). Credit 2. I, II, S**

Development and preparation of instructional materials and testing of laboratory problems pertaining to mild steel and tubular metal.

**635. Industrial Design and Development. (3-0). Credit 3. I, S**

Advanced procedure in preparing teachers for industrial design and development. Historical review of design, effect of aesthetic, social, and economic factors on a design concept and relationship between function and production processes. Prerequisite: I.Ed. 336 or equivalent.

**681. Seminar. (1-0). Credit 1. I, II, S**

General discussions of laws, legislation, certification, professional ethics, and other current problems relating to industrial education teaching profession.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Designed to enable graduate majors to undertake and complete with credit limited investigations not within thesis research and not covered by any other course.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis or dissertation.



## Department of Industrial Engineering

Professors Burgess (Head), CoVan; Associate Professors Smith, Wortham; Assistant Professors Drew, Mitchell, Nash, Fox; Instructors Council, Street

### 201. Computer Programming for Engineers. (1-0). Credit 1. II

Programming engineering calculations for solution by electronic computers using current algorithmic language. Prerequisite: Math. 308 or registration therein.

### 302. Production Engineering. (1-2). Credit 2. I, II

Coordinated study of manufacturing processes and equipment; operation sequence planning; economic aspects of equipment selection. Tooling and processing product from design to final assembly. Emphasis is on latest developments in manufacturing techniques. Prerequisites: M.E. 201, 310.

### 401. Survey of Industrial Engineering. (3-0). Credit 3. I, II, S

Survey of industrial engineering field; administrative decisions, layout of equipment, materials handling, production control, quality control, motion and time study, cost determination, wage plans, job evaluations, operations research, use of computers by management. Prerequisite: Junior classification.

### 403. Production Management. (3-0). Credit 3. II

Survey course in principles of production for business administration majors. Prerequisite: Senior classification in business administration.

### 404. Motion and Time Study. (2-3). Credit 3. I, II

Standardization of job conditions; methods improvement and motion economy; flow process charts and diagrams, micromotion, analysis, simo-charts, multiple-activity charts; allowances; rating methods; taking time studies; standard data and time formulas. Prerequisite: Junior classification.

### 412. Labor and Industry. (3-0). Credit 3. I, II

Brief review of history of organized labor; critical study of fundamental Federal and State laws governing labor-management relations; study of current interpretations of labor laws, controversial labor-management issues and their solutions. Prerequisite: Senior classification.

### 414. Statistical Control of Quality. (2-3). Credit 3. I

Engineering aspects of controlling quality through use of statistical methods. Frequency distributions, control charts for variables, control for fraction defective and defects per unit. Sampling inspection plans. Design of specifications. Prerequisite: Junior classification.

### 415. Production Control. (1-3). Credit 2. I

Planning and control of production; operation analysis; routing, scheduling; dispatching; production charts and boards; inventory control; accumulation of material requirements; forecasting; economic lot size. Critical path techniques. Prerequisites: I.En. 302, registration in 404.

### 416. Factory Layout. (1-6). Credit 3. II

Layout of complete factory for selected product. Use of machine templates and models; design of materials handling systems; auxiliary services; design of storerooms; loading docks; machine selection; estimate of unit costs; estimate of capital requirements. Prerequisite: I.En. 415.

### 420. Introduction to Operations Research. (3-0). Credit 3. II

Study of modern techniques used by engineers for controlling manufacturing costs. Computing probable returns from investments. Use of break-even charts, profit graphs, machine replacement studies, comparison of alternative methods, standard costs. Introduction to operations research. Prerequisite: I.En. 414.

### 453. Tool Engineering. (2-3). Credit 3. I

Selection and design of tools, jigs, fixtures, and gages. Economics of choice of tooling. Dimensioning and tolerances. Methods of locating, clamping, and feeding. Principles of automation. Graphical solution of tool design problems. Numerical control of machine tools. Prerequisites: C.E. 305; I.En. 302; registration in M.E. 337.

### 458. Programming of Digital Computers. (3-2). Credit 4. I, II, S

Operation of digital computer; flow charts; sub-routines; library programs;

floating point; multiple precision; error analysis; optimum coding; symbolic coding; interpretive coding; automatic coding, practical applications. Prerequisite: Junior classification.

**481. Seminar. (0-2). Credit 1. II**

Investigation and report by students of topics of current interest in industrial engineering. Experimental studies are made wherever feasible.

**485. Special Problems in Industrial Engineering. Credit 1 to 3. I, II, S**

Permits work on special project in industrial engineering. Project must be approved by Department Head. Prerequisite: Senior classification in industrial engineering.

### FOR GRADUATES

**601. Industrial Surveys. (2-0). Credit 2. II**

Engineering problems related to industrial investigations, reports on organizations, personnel, capital equipment, financial policies, market, etc. Prerequisite: I.En. 416.

**603. Human Relations in Industry. (4-0). Credit 4. I**

Causes of misunderstandings between managements and labor; conditions which influence attitudes and productivity of workers; principles of leadership. Direct worker incentive, seasonal bonuses, quality incentives, profit sharing plans. Prerequisites: I.En. 404, 412.

**604. Advanced Time and Motion Studies. (1-6). Credit 3. I**

Advanced methods in time and motion study; balancing operations; learning curves; work sampling; memomotion and chronocyclegraph studies; fatigue effects; determination and application of elemental time data; statistical methods in time study. Prerequisite: I.En. 404.

**608. Industrial Case Analysis. (3-0). Credit 3. II**

Practice in application of principles to solution of actual case problems involving broad management decisions. Special attention given to problems indigenous to Texas industry. Prerequisite: Graduate classification in industrial engineering or approval of Department Head.

**614. Advanced Quality Control. (3-3). Credit 4. I**

Advanced statistical methods applied to quality control problems; significance tests; correlation analysis; sequential sampling; analysis of variance; design of engineering experiments; principles of reliability. Prerequisite: I.En. 414.

**615. Production and Inventory Control. (3-3). Credit 4. II**

Recent developments in technique used to control inventories and production by means of statistical analysis of problems, simulation techniques, and mechanized execution of inventory and production control functions. Prerequisite: I.En. 415.

**620. Principles of Operation Analysis. (4-0). Credit 4. II**

Use of mathematical models in making decisions; optimizing over-all policies; probability methods, linear programming; transportation models; queuing theory; learning curves; information theory; Monte Carlo methods. Prerequisites: I.En. 420, 614.

**621. Computer Methods in Industrial Engineering. (2-3). Credit 3. I, S**

Principles and applications of computers to solution of various industrial engineering problems. May not be taken for credit with I.En. 615 and 620. Prerequisites: I.En. 458; graduate classification in engineering or computer science.

**641. Computer Languages. (2-6). Credit 4. I, S**

Study of design and use of computer oriented and problem oriented languages for digital computers. Prerequisites: I.En. 458; Math. 417.

**642. Computer Methods in Applied Sciences. (2-6). Credit 4. II**

Techniques of analysis and programming required to utilize stored program digital computer for solution of some typical physical systems. Prerequisites: I.En. 458; Math. 609.

**643. Logic of Information Processing. (2-6). Credit 4. II**

Principles and application of digital computers to problems of data reduction,

information retrieval, and large scale commercial data processing problems. Prerequisite: I.En. 641.

**645. Data Processing Management. (3-0). Credit 3. S**

Presents comprehensive study of problems associated with management of data processing facility. Particular emphasis placed on problems of machine configuration, personnel, systems planning, and personnel training requirements. Prerequisite: I.En. 641.

**651. Tool Design. (3-3). Credit 4. II**

Design of automatic machine tools; tracer and director control of tool paths; automatic feeding, holding, indexing and ejection of work pieces; tool replacement analysis. Automatic inspection and sorting, assembly, and packaging. Prerequisite: I.En. 453.

**681. Seminar. (2-0). Credit 2. II**

Group study and discussion of current developments in industrial engineering practices as reported in literature and as presented by representatives from industry. Prerequisite: Graduate classification in industrial engineering.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Investigation of special topics not within scope of thesis research and not covered by other formal courses. Prerequisite: Graduate classification in industrial engineering.

**691. Research. Credit 1 or more each semester. I, II, S**

Research in industrial engineering field; subject to meet needs of individual student.

## Department of Journalism

Professor McGuire (Head); Associate Professor Bowers; Instructors Gougler, Knight

**102. Communications Media and Principles. (2-0). Credit 2. I, II**

Introductory survey of mass communications media, their purpose and methods of operation to give the journalism major a panoramic view and the non-major an understanding of importance of communications media in modern society.

**201. News Writing. (2-3). Credit 3. I**

Beginning reporting; study of types of news; leads; body treatment of story; feature in lead; facts; background and practice in writing straight news story. Prerequisite: Knowledge of typing.

**202. Beginning News Reporting. (2-3). Credit 3. II**

Study of news sources; style; interviewing; news analysis and discussion; handling of various types of news; emphasis on clear writing, practical reporting experience. Prerequisite: Jour. 201.

**300. Summer Practice. Ten weeks; required; no credit. S**

Summer practice in newspaper, magazine, or other communications office, as approved by Department Head. Required previous to registration for fourth year. Prerequisite: Junior classification.

**304. Feature Story Writing. (2-2). Credit 3. I**

Writing of magazine and feature stories; types of feature articles; sources; titles; markets; slanting articles for particular markets; style, word usage; beginnings, illustrations.

**306. Newspaper Production and Management. (2-2). Credit 3. II**

Business of managing newspaper; community newspaper; study of newspaper as service organization; social responsibilities; influence of community; mechanics of printing; managership; business side of conducting paper. Prerequisite: Jour. 202.

**307. News Editing. (2-3). Credit 3. I**

Editing of news; intensive training in publication style, news evaluation, copy reading mechanics and techniques, headline writing and proof-reading; understanding of journalistic responsibilities. Prerequisite: Jour. 202.

**308. Newspaper Advertising. (2-3). Credit 3. I**

Advertising layout and copy for newspapers and other publications; intensive



practice in newspaper layouts; writing of retail copy; servicing of newspaper accounts. Prerequisite: Approval of instructor.

**309. Advertising Copy, Layout and Production. (2-3). Credit 3. II**

Application of tested advertising methods to preparation of merchandising copy; layout design; and production of publication advertising. Sales appeals; attention factors, layout planning, illustrations, copy writing, production methods and problems. Prerequisite: Jour. 308.

**311. Radio and Television News Writing. (2-2). Credit 3. II, S**

Study and analysis of basic methods of writing for radio and television; special emphasis on techniques required in processing news copy; pictures and film. Guidance in newsroom operation, getting story, filming news; scripting and editing, and handling equipment.

**315. Photography. (1-3). Credit 2. I, II, S**

Fundamentals of photographic theory and practice; cameras, lenses and shutters; exposure and development of negative; black and white printing processes; lighting (natural, flash, and flood). Emphasis on photography as medium of communication.

**321. Industrial Journalism. (2-2). Credit 3. I, II, S**

Study of technique of writing technical articles and reporting news related to engineering, industry, science, and other specialized interests; preparation of fact articles for technical and trade journals.

**406. Publicity and Public Relations. (3-0). Credit 3. II**

Practical analysis of various fields of publicity and public relations. Theory and practice in various aspects of functioning publicity, including news writing, advertising, and radio.

**409. History and Principles of Journalism. (3-0). Credit 3. I**

Development of American journalism from colonial times to present, projecting the press as institution against background of economic, social, and political history of the nation. Includes ethics of profession.

**410. Publications Production and Graphic Arts. (2-3). Credit 3. II**

Brief history of printing; practical design, layout, and editing of publications with laboratory practice in copy and picture selection and editorial supervision. Prerequisite: Jour. 307.

**412. Editorial Writing. (3-0). Credit 3. II**

Writing of editorials; editorial page; editorial campaigns; what constitutes editorial policy; ethics in editorial writing. Prerequisite: Jour. 304.

**415. Agricultural Journalism. (2-2). Credit 3. I, II, S**

Basic news writing; emphasis on preparation of articles for actual publication in newspapers and agricultural journals. Research and other campus activities serve as source material for writing articles in laboratory.

**418. Reporting of Public Affairs. (2-3). Credit 3. I**

Study and practice in reporting crime, the courts, and governmental activities with emphasis on interpretation of these news areas. Prerequisite: Jour. 202.

**420. Law of the Press. (3-0). Credit 3. II**

A detailed study of laws of publication and consideration of defamation, sedition, privilege, and ethics. General laws, relating to the press of the United States and of the states with emphasis on Texas. Prerequisite: Jour. 307 or approval of Department Head.

**462. High School Journalism and Publications. (3-0). Credit 3. S**

Problems of advising school newspapers and yearbooks; school publication as public relations tool; selecting and training staff; financing; planning content of high school journalism course. Prerequisites: Twelve semester hours of English; approval of Department Head.

**465. International Communications and Propaganda. (3-0). Credit 3. I**

Communication problems and practices of major nations. Theory and functioning of the press under fascism, communism and democracy; international news distortion

and propaganda; place of mass media in international relations. Prerequisite: Senior classification; approval of Department Head.

**466. Techniques of Mass Communications. (3-0). Credit 3. II, S**

Survey of methods of research in mass communications. Directed reading and discussion of outstanding professional literature in field of journalism, and analysis of major issues in contemporary journalism. Prerequisites: Senior classification; approval of Department Head.

**485. Problems. Credit 1 to 4 each semester. I, II, S**

Research problems related to communications field. Individual work, fitted to special needs of specific student as determined by his interests and aptitude.

### Liberal Arts

**105. Honors Colloquium for Freshmen. (1-0). Credit 1. I**

Survey of natural sciences. Lectures, discussions, and reports on individual readings. Prerequisite: Enrollment in Honors Program.

**106. Honors Colloquium for Freshmen. (1-0). Credit 1. II**

Survey of social sciences and humanities. Lectures, discussions, and reports on individual reading. Prerequisite: Enrollment in Honors Program.

**201. Survey of Music Literature. (1-2). Credit 2. I, II, S**

Study of various types and styles of music literature. Lectures supplemented by listening. Music illustrations selected primarily from standard concert repertoire. For the music listener with little or no formal training in music.

**311. Use of Library Resources. (0-2). Credit 1. I, II**

Designed to develop in students skill in use of library resources at upper level. Emphasis placed on specialized reference tools. Prerequisites: Completion of sophomore English; junior classification.

### Department of Marine Engineering

Associate Professors Tormollan (Acting Head), Dahm; Instructors Luehning, Mercer;  
Lecturers Moore, Holzswieg

**102. Orientation. (0-2). Credit 1. I**

Introduction to basic marine engineering systems. General description of ship-building industry related to steamship industry. Career of engineer officer surveyed.

**200. Basic Operations. Credit 4. S**

Represents practical application of student's classroom studies while at sea in training ship during sea training period. Student required to complete several projects relating to engineering plant of ship.

**201. Marine Engineering Mechanics. (3-0). Credit 3. I**

Application of principles of mechanics to elementary problems of marine engineering design. Topics include: forces and couples, analysis of structures and friction; principles of kinetics and kinematics.

**203. Engineering Laboratory. (1-3). Credit 2. I**

Study of pipe and valve standards; packing and gasket material; gearing and bearings; use of brass and copper service tubing; silver brazing techniques; corrosion controls in heat exchangers.

**204. Engineering Laboratory. (1-3). Credit 2. II**

Academic and practical study of various marine power systems in use today and some future developments. Visits to various ships in Galveston harbor and to local shipyard will be scheduled.

**300. Intermediate Operations. Credit 4. S**

Training program for second sea training period. Sea projects required of each student under supervision of officer-instructors. Lifeboat and safety training included.

**301. Fluid Mechanics and Heat Transfer. (3-0). Credit 3. I**

Application of principles of fluid statics and dynamics to marine engineering problems. Study of fundamental laws relating to heat flow; characteristics of pumps; topics in compressible flow.

**302. Engineering Laboratory. (0-3). Credit 1. II**

Demonstration of basic concepts of fluid mechanics; calibration of flow meters, centrifugal pumps, orifice and weir flow. Additional practice given in principles and operations of power machinery.

**303. Marine Thermodynamics. (3-0). Credit 3. I**

Energy concepts. First and second law of thermodynamics. Carnot and Rankine principles and reversible heat cycles. Properties and processes of vapors; vapor power cycles and vapor refrigeration cycles.

**304. Marine Thermodynamics. (3-0). Credit 3. II**

Properties and processes of perfect gases, gas compression cycles, gas power cycles, air refrigeration cycle, and processes involving mixture of gases and vapors.

**305. Strength of Materials. (3-0). Credit 3. II**

Fundamental principles underlying analysis and design of machine members subjected to various combinations of loading. Emphasis given to theoretical and empirical basis for material specification formulas as found in United States Coast Guard Marine Engineering Regulations.

**306. Marine Refrigeration and Air Conditioning. (2-2). Credit 3. II**

Theory and practice of mechanical refrigeration. Specific topics include: thermodynamics of Reverse Carnot cycle, vapor compression cycles; thermal, physical, and chemical properties of refrigerants. Descriptions of shipboard ventilation and air conditioning.

**307. Electrical Circuits. (3-2). Credit 4. I**

Study in fundamental electrical theory as it applies to understanding of behavior, mode of operation, applications, and maintenance of electrical equipment as used aboard ship. Measurements of circuit phenomena including fundamental amplifiers and rectifiers. Prerequisites: Math. 122; Phys. 202.

**308. Electrical Machinery. (2-3). Credit 3. II**

Study of principal types of electrical machines aboard ship, including their characteristics, applications, and control devices. Laboratory work includes actual operation and testing of electrical machinery and equipment of type installed aboard ships.

**331. Theory and Application of Electron Tubes. (3-3). Credit 4. I**

Study of theory of operation and characteristics of electronic devices and circuits with emphasis on instrumentation and control. Survey made of electronic devices found aboard ship with concentration on maintenance and repair.

**400. Advanced Operations. Credit 4. S**

Training program for third sea training period. At end of this period each student will have achieved knowledge and will have demonstrated his ability to take complete charge of modern marine power plant while underway at sea.

**401. Nuclear Propulsion I. (3-0). Credit 3. I**

Study of reactor mechanics with emphasis placed on fluid hydraulics, reactor core design, reactor fuels and their properties, shielding, construction and operation of related auxiliary machinery.

**402. Diesel Engineering. (2-2). Credit 3. II**

Basic principles of two and four stroke cycle diesel engines; intake, scavenging and exhaust systems; injection systems, starting and reversing methods; cooling and lubricating systems; and engine room layout in modern motor vessels.

**403. Marine Steam and Gas Turbines. (2-2). Credit 3. I**

Analysis of gas turbine cycles, high speed gas flow, turbine and compressor kinematics and thermodynamics; construction of marine steam turbines and their operating principles as applied to main propulsion and auxiliary use aboard ship; reciprocating engines.



**404. Maritime Regulatory Law. (3-0). Credit 3. II**

Study of marine engineering standards, specifications, and requirements prescribed by Bureau of Marine Inspection, U. S. Coast Guard; American Bureau of Shipping; and Bureau of Ships, U. S. Navy.

**405. Steam Generators. (2-2). Credit 3. I**

Characteristics, historical development, and classification of marine boilers. Construction specifications of U. S. Coast Guard Marine Engineering Regulations. Principles of combustion and boiler head balance when using fuel oil. Water conditioning and procedures in operation and maintenance.

**406. Engineering Repairs. (1-3). Credit 2. II**

Basic foundations in theory and practical applications of machinery repair equipment commonly found aboard ship. Practice in oxy-acetylene welding, brazing, cutting, and electric arc welding; pipe welding, tube sweating; valve and pump maintenance; emergency repairs.

**408. Nuclear Propulsion II. (2-2). Credit 3. II**

Study of reactor controls and instrumentation including basic electronics, design, installation, and maintenance of various types of control systems. Survey of nuclear propulsion and marine industry. Advantage taken of shipyard nuclear facilities in Galveston area for practical field trips.

**409. Naval Architecture III. (2-0). Credit 2. I**

Resistance and powering of ships; principles of model testing and similitude for ships hulls and propellers, and propulsive efficiency. Fundamentals of propeller design, blade strength and cavitation.

## Department of Marine Transportation and Nautical Science

Associate Professor Smith (Head); Assistant Professor Hopkins; Instructor Cannon;  
Lecturer Devoy

### MARINE TRANSPORTATION

**101. Maritime Orientation. (0-2). Credit 1. I**

Survey of maritime industry, ocean transportation, trade routes, and role played by U. S. Merchant Marine in world trade and national defense. Ship organization and general operating methods are discussed. Emphasis placed on career patterns.

**301. Ocean Transportation I. (4-0). Credit 4. I**

Concerned with shipping in world economy; production of service, including shipping process, equipment, labor, conferences, rate-making, role of government; buying of service by shipper; finance of shipping; and international conventions and treaties.

**302. Marine Cargo Operations I. (2-2). Credit 3. I**

Essential requirements and problems in stowage and carriage of general and bulk (dry and liquid), refrigerated, and special cargos. Theoretical and practical problems in receiving, stowing, securing, transporting, and discharging all types of cargo.

**304. Ocean Transportation II. (3-0). Credit 3. II**

Concerned with carriage of goods under bills of lading and charter parties; terminal management and operation and types of carriers. Pertinent sections of American and British Shipping Laws are thoroughly studied. Prerequisites: Mar.T. 301.

**402. Ocean Transportation III. (4-0). Credit 4. III**

Covers essential principles of Admiralty and Maritime Law; advanced principles of marine insurance. Takes up in detail standard forms and Institute Clauses. Attention paid to nuclear maritime insurance activities. Principles of International Law are discussed. Prerequisite: Mar.T. 304.

**406. Marine Cargo Operations II. (2-2). Credit 3. II**

Stowage of special cargoes; ship's papers; entry and clearance procedures are covered. Laboratory work consists of problems involving research and planning. Each student will complete project related to shipping process.

## NAUTICAL SCIENCE

**102. Ship Organization and Operations. (2-0). Credit 2. II**

Elementary introduction to ship organization covering such topics as station bills, routine, duties of personnel; types of ships, ship nomenclature; safety at sea and emergency drills; general preparation for first sea training period.

**200. Basic Communications, Navigation, and Seamanship. Credit 4. S**

Practical application of student's classroom studies aboard training ship during first training cruise. Student completes basic projects in communications, navigation, and seamanship.

**201. Naval Architecture I. (3-0). Credit 3. I**

Description of ship as self-sustaining unit; shipbuilding nomenclature and dimensions, types of construction and classification of merchant ships; classification societies; shipbuilding materials and methods, and structural components of ship.

**202. Naval Architecture II. (2-0). Credit 2. II**

Ship's lines drawing and form calculations; principles of flotation and buoyancy; inclining experiments, free liquids, transverse stability; motion of ships in waves, seaway and dynamic loads; ship structure tests.

**203. Seamanship I. (2-3). Credit 3. I**

Art of handling small boats under oars, sail, and power. Lifeboat launching and equipment; construction and types of boats. Application of ground tackle, knotting and splicing, blocks and tackle. Communications practice; Rules of Nautical Road.

**204. Terrestrial Navigation. (3-0). Credit 3. I**

Fundamentals of basic navigation with definitions; plane sailing, middle latitude sailing, and mercator sailing; piloting, charting projections, chart navigation.

**300. Intermediate Communications, Navigation, and Seamanship. Credit 4. S**

Practical application of student's classroom studies aboard training ship; during second training cruise. Student completes intermediate projects in communications, navigation, and seamanship.

**301. Seamanship II. (2-3). Credit 3. I**

Mechanical appliances on shipboard; heavy lifts; accident prevention. Marine inspection laws and communications.

**302. Seamanship III. (1-3). Credit 2. II**

Qualifying tests in communications. Thorough study made of U. S. Public Health requirements in first aid and ship sanitation. Marine inspection rules for safety at sea are stressed.

**303. Celestial Navigation. (2-3). Credit 3. I**

Survey of nautical astronomy, use of nautical almanac, sextant, compass error, and several short tabulated methods of solving the astronomical triangle are covered. Study of navigator's work at sea.

**304. Electronic Navigation. (2-2). Credit 3. II**

Study of theory, methods, and application of determining position by means of electronic aids including radar, direction finder, and Loran. Student examined by U. S. Coast Guard for certification as Radar Observer.

**400. Advanced Communications, Navigation, and Seamanship. Credit 4. S**

Represents practical application of student's classroom studies aboard training ship during third training cruise. Student completes advanced projects in communications, navigation, and seamanship.

**401. Seamanship IV. (2-3). Credit 3. II**

Principles and methods of propulsion and steering of ships. Ship handling in heavy seas, docking, undocking, anchoring, mooring, towing, salvage, and ice seamanship. Damage control stressed. Qualification examinations are held in seamanship and communications.

**404. The Navigator. (2-3). Credit 3. II**

Exercise in day's work of navigator at sea. Planning routes of voyages. Study made of buoyage systems used throughout world and survey made of various sailing

guides and port directories. Gyroscope compass fundamentals and magnetic compass compensation.

### Department of Mathematics

Professors Basye, Brewer, Hurt, Keown, Klipple (Head), Luther; Associate Professors Hall, Kent, McCulley, McGee, Moore, Sims, Tittle; Assistant Professors Bailey, Bryant, Huggins, Lyle, Perry; Instructors Abdo, Gonzalez, Heatherly, Hovorak, Koehl, Lacey, Moehlman, Porter, Todd, Williams; Lecturer Chambers

#### 101. Algebra. (3-0). Credit 3. I, II, S

Review of fundamentals of mathematics, graphs, systems of linear equations, exponents and radicals, quadratic equations, binomial theorem.

#### 102. Algebra. (3-0). Credit 3. I, II, S

Sets, structure of number system; absolute values, solution sets of equations of second and higher degree, of systems of equations, and of inequalities; relations and functions, graphical representations, variation; progressions; mathematical induction; determinants; partial fractions.

#### 103. Plane Trigonometry. (3-0). Credit 3. I, II, S

Definitions of trigonometric functions, evaluation of functions of special angles, fundamental relations, solution of triangles, trigonometric reductions, angular measure, functions of composite angle, logarithms, inverse trigonometric functions, trigonometric equations.

#### 104. Analytic Geometry. (3-0). Credit 3. I, II, S

Rectangular coordinates; equations and sets of points; lines, circles, and other conic sections; transformations, parametric equations; graphs of transcendental functions; polar coordinates; equations of surfaces.

#### 106. Spherical Trigonometry. (3-0). Credit 3. II

Geometry of sphere; solution of spherical triangles; application of spherical trigonometry to terrestrial and celestial spheres. Brief survey of celestial system included. Prerequisite: Math. 103.

#### 110. Survey Course in Mathematics. (3-0). Credit 3. I, II, S

Functions and graphs, derivatives of polynomials, integrals of polynomials, systems of equations, logarithms, progressions, binomial theorem, compound interest and annuities, permutations and combinations, probability. Prerequisite: Math. 102.

#### 116. Plane Trigonometry and Analytic Geometry. (4-0). Credit 4. I, II

Trigonometric functions, fundamental relations, solution of triangles, angular measure, logarithms, graphs; the straight line, circle, parabola, ellipse, hyperbola, polar coordinates, sketching of surfaces. Prerequisite: Math. 102. (For students registered in architecture.)

#### 121. Analytic Geometry and Calculus. (4-0). Credit 4. I, II, S

Rectangular coordinates; equations and sets of points; lines, conic sections; functions, limits, derivatives of algebraic functions, applications, integration of polynomials, areas and volumes by integration. Prerequisites: Math. 102 and 103, or satisfactory performance on a qualifying examination.

#### 122. Calculus. (4-0). Credit 4. I, II, S

Derivatives of transcendental functions; comprehensive study of integration; application of integration to moments; arc lengths, areas of surfaces of revolution, liquid pressure, and work; improper integrals; indeterminate forms. Prerequisite: Math. 121 or 209.

#### 209. Calculus. (3-0). Credit 3. I, II, S

Variables, functions, and limits. Derivatives and differentials for polynomials and applications. Integration of polynomials and applications. Differentiation of algebraic functions. Prerequisite: Math. 104.

#### 210. Calculus. (3-0). Credit 3. I, II, S

Differentiation and integration involving transcendental functions together with



applications. Improper integrals, approximate integration, indeterminate forms, mean value theorems. Prerequisite: Math. 209.

**215. Finite Mathematics. (3-0). Credit 3. I, II**

Logic, theory of sets, Venn diagrams, partitions and counting, vectors and matrices, linear programming, theory of games, applications to business problems. Prerequisite: Math. 110.

**223. Differential and Integral Calculus. (4-0). Credit 4. I, II**

Limits, the derivative, maxima and minima, differentiation of polynomials; the definite integral; volume, differentiation of implicit functions, special devices for integration, center of gravity, moment of inertia, double integrals. Prerequisite: Math. 116. (For students registered in architecture.)

**303. Theory of Equations. (3-0). Credit 3. I, II**

Sets, relations, functions, binary operations, axiomatic study of number systems; vector spaces, linear transformations; permutations, groups. Prerequisite: Math. 122 or 210.

**307. Calculus. (3-0). Credit 3. I, II, S**

Introduction to series. Taylor's series, partial differentiation, multiple integrals, applications. Prerequisite: Math. 122 or 210.

**308. Differential Equations. (3-0). Credit 3. I, II, S**

Elementary and linear equations with applications, solution by Laplace transforms and by series, Fourier series, applications. Prerequisite: Math. 307.

**315. Introduction to Modern Algebra. (3-0). Credit 3. I, II, S**

Sets and mappings, groups, rings, integral domains, number theory, isomorphism, fields, vector spaces, matrices. Prerequisite: Math. 122 or 210 or 215.

**405. Vector Analysis. (3-0). Credit 3. I, II**

Elementary operations, vector and scalar products of two vectors, vector and scalar products of three vectors, differentiation of vectors, differential operators, applications to electrical theory, dynamics, mechanics, and hydrodynamics. Prerequisite: Math. 307.

**407. Complex Variables. (3-0). Credit 3. I, II, S**

Fundamental theory of analytic functions, including residues and their applications. Prerequisite: Math. 308.

**409. Advanced Calculus. (3-0). Credit 3. I, II, S**

Concept of function, limit of sequence, continuity, theorems on continuous functions, definite integral, derivative, mean value theorems, hyperbolic functions, improper integrals. Prerequisite: Math. 307.

**410. Advanced Calculus. (3-0). Credit 3. II**

Theory of plane curves, mechanics of a particle. Taylor's theorem and applications, numerical integration, convergence and divergence of series, power series, periodic functions, Fourier series. Prerequisite: Math. 409.

**411. Mathematical Probability. (3-0). Credit 3. I, II**

Event sets; probability concepts; functions based on discrete and continuous event sets; binomial, hypergeometric, gamma, beta and normal functions; moments and moment generators; determination of probability functions by inverse processes. Prerequisite: Math. 307.

**414. Mathematical Statistics. (3-0). Credit 3. I, II, S**

History and terminology of statistics, probability theory, discrete and continuous distributions, expected values, moments, sampling, confidence intervals, tests of hypothesis. Prerequisite: Math. 307.

**415. Modern Algebra. (3-0). Credit 3. I, S**

Integers, rational numbers, real numbers, complex numbers. Groups, rings, integral domains, fields. Polynomials over a field. Prerequisite: Math. 307.

**416. Modern Algebra. (3-0). Credit 3. II**

Fundamental concepts of group theory. Introduction to representation theory of finite groups. Prerequisite: Math. 415.

**417. Numerical Analysis. (3-3). Credit 4. I, II, S**

Numerical methods, error and convergence analysis, orthogonal polynomials, elementary matrix theory, computer programming of appropriate problems. Prerequisite: Math. 308 or registration therein.

**485. Problems. Credit 1 to 4. I, II, S**

Special problems in mathematics not covered by any other course in the curriculum. Work may be in either theory or laboratory. Prerequisite: Approval of Department Head.

**FOR GRADUATES****600. Fundamental Mathematics in Secondary Schools. (3-0). Credit 3. S**

Basic concepts of arithmetic, algebra, geometry, and trigonometry as viewed from standpoint of higher analysis; famous problems; construction of tables and slide rules; other topics designed to help vitalize teaching of high school mathematics. Prerequisite: Math. 122 or 210.

**601. Higher Mathematics for Engineers and Physicists. (4-0). Credit 4. I, II, S**

Surface integrals, line integrals, vector analysis, partial differential equations, elementary complex variables, applications. Prerequisite: Math. 308.

**602. Higher Mathematics for Engineers and Physicists. (4-0). Credit 4. I, II, S**

Fourier integrals, Bessel and Legendre functions, Laplace's equation, diffusion equation, wave equation, Green's functions. Prerequisite: Math. 601.

**606. Theory of Probability. (4-0). Credit 4. II**

Markov processes, matrix theory applications, special limit theorems, transforms. Prerequisite: Math. 411.

**607. Real Variables. (4-0). Credit 4. I**

Fundamental theory of number sets and point sets, elementary applications to real functions, theory of linear measure. Prerequisite: Math 409.

**608. Real Variables. (4-0). Credit 4. II**

Measurable functions; the Riemann integral, the Lebesgue integral, applications to real functions and series. Prerequisite: Math. 607.

**609. Numerical Analysis. (3-3). Credit 4. I, II**

Linear and non-linear programming; simulation, Monte Carlo techniques, game theory. Laboratory will consist of programming appropriate problems. Prerequisite: Math. 417.

**610. Numerical Methods in Differential Equations. (3-3). Credit 4. II**

Elementary numerical solutions, analytical foundations, systems of equations, higher order equations, two-point boundary problems, numerical methods for partial differential equations. Laboratory will consist of programming a high speed digital computer. Prerequisite: Math. 417.

**611. Ordinary Differential Equations. (4-0). Credit 4. I**

General methods for first order equations, singular solutions, applications, special methods, linear equations of second order, method of successive approximations, systems of ordinary equations. Prerequisite: Math. 601.

**612. Partial Differential Equations. (4-0). Credit 4. II**

General solution of first order equations, second order equations from physics and mechanics. Prerequisite: Math. 611 or equivalent.

**615. Vector Spaces and Matrices. (4-0). Credit 4. I**

Development of fundamental properties of matrices by use of vector spaces and linear transformations. Prerequisite: Math. 409 or 415.

**616. Linear Transformations and Matrices. (4-0). Credit 4. II**

Development of canonical forms for matrices by use of transformations. Prerequisite: Math. 615.

**617. Complex Variables. (3-0). Credit 3. I, S**

Conformal mapping, the Schwartz-Christoffel theorem, infinite products, entire functions, meromorphic functions, the gamma function. Prerequisite: Math. 407.

**618. Complex Variables. (3-0). Credit 3. II**

Hypergeometric functions, elliptic functions, Riemann surfaces. Prerequisite: Math. 617.

**620. Fourier Series and Allied Topics. (4-0). Credit 4. II**

First four chapters of Zygmund plus recent developments in almost everywhere convergence of Fourier series. Prerequisite: Math. 608 or registration therein.

**622. Laplace Transforms. (4-0). Credit 4. II, S**

Fundamental theorems concerning Laplace transforms. Applications to ordinary and partial differential equations, difference equations, and integral equations. Prerequisite: Math. 601.

**623. Higher Mathematics for Chemical Engineers. (4-0). Credit 4. II**

Derivation and solution of differential equations of chemistry and chemical engineering, mathematical theory of distillation, series solutions of differential equations, Bessel functions. Prerequisite: Math. 308.

**624. Higher Mathematics for Chemical Engineers. (4-0). Credit 4. I**

Equations of finite differences, applications of partial differentiation, solution of partial differential equations, Fourier integrals, orthogonal systems, numerical and graphical methods, theory of errors. Prerequisite: Math. 623.

**625. Matrix Algebra and Tensor Calculus. (4-0). Credit 4. I, II, S**

Elementary matrix operations; canonical forms; special matrices; characteristic roots; tensor concept; covariance and contravariance; metric tensors; Christoffel's symbols; covariant differentiation. Prerequisite: Math. 405 or 601.

**627. Theory of Numbers. (3-0). Credit 3. I**

Ordered rings, the ring of integers, Euclidean rings, congruences, the Fermat-Euler theorem, residues of powers, quadratic residues, the Legendre and Jacobi symbols, quadratic reciprocity, character sums, diophantine equations, tests of primality. Prerequisite: Math. 409 or 415.

**628. Theory of Numbers. (3-0). Credit 3. II**

Commutative rings; ideals and residue class rings; principal ideal rings; unique factorization rings; quadratic fields; fields of higher degree. Prerequisite: Math. 627.

**633. Group Representations. (4-0). Credit 4. I**

Representation theory of the rotation and the homogeneous Lorentz group. Prerequisites: Math. 415; approval of instructor.

**636. Topology. (3-0). Credit 3. II**

Axiomatic treatment of topological spaces. The metrization problem. Applications to arcs and curves. Prerequisite: Math. 607.

**638. Calculus of Variations. (3-0). Credit 3. II**

Theory and applications of methods of calculus of variations as applied to optimal problems. Prerequisite: Math. 601.

**639. Iterative Techniques. (3-3). Credit 4. I**

Iterative techniques for solving single equations, systems of equations, and eigenvalue problems. Prerequisite: Math. 615.

**641, 642. Modern Analysis. (4-0). Credit 4 each semester. I, II**

Recent developments in theory of functions. Prerequisite: Math. 608.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

A course offered to enable students to undertake and complete with credit limited investigations not within their thesis research and not covered by any other courses in curriculum. Prerequisite: Math. 601.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis or dissertation.



## Department of Mechanical Engineering

Professors Crawford, Holdredge, Kettleborough, Simmang (Head), Thompson, Truettner, Wingren; Associate Professors Caddess, Fletcher, Gaddis, Gibbs, Guthrie, Kozik, Perry; Assistant Professors Alter, Fontana, Nash, Noyes, Weiner; Instructors Brown, Gibson, Kranz, Stallings

### 101. Engineering Problems. (0-3). Credit 1. I, II

Introduction to elementary mechanics to include forces and force systems, units and dimensional equations, free body concept, motion and application of Newton's laws of motion. Prerequisites: Math. 102, and 103 or 116, or registration therein.

### 201. Manufacturing Processes. (0-3). Credit 1. I, II

Simple pattern layout and construction; storage, costs, and weights of patterns and casting, the patternmaking industry. Core-making; foundry layouts; practice in moulding and casting both ferrous and non-ferrous metals. Welding demonstration and practice in Heliarc, Atomic-hydrogen, metallic arc, electrical resistance, oxy-acetylene, and metallizing. Prerequisite: E.G. 105.

### 202. Manufacturing Processes. (0-3). Credit 1. I, II

Continuation of M.E. 201, including advanced methods of patternmaking, moulding, and weld inspection and testing, fundamentals of joint design and metallography. Prerequisite: M.E. 201.

### 212. Engineering Mechanics. (3-0). Credit 3. I, II, S

Forces and couples, force systems, resultants, components, equilibrium, frame structures, center of gravity, and moment of inertia. Prerequisites: Math. 122 or 210 or registration therein; Phys. 218.

### 222. Materials Science. (2-0). Credit 2. II

Introduction to engineering materials and underlying theories that account for their behavior. Effects of tension, compression, bending, and thermal applications. Creep, fatigue, hardness, corrosion, and selected properties are stressed. Materials covered include metals, ceramics, plastics, and aggregates. Prerequisites: Chem. 102 or 104; M.E. 212; registration in Phys. 220.

### 309. Machine Production Techniques. (0-3). Credit 1. I, II, S

Lecture demonstrations and practice in safety, care of machines and hand tools, shop organization, cutting speeds and feeds, standard machine tool work in metals, single point tool grinding, layout, drilling, tapping, shaping, turning, boring, threading, and milling. Prerequisite: E.G. 105.

### 310. Machine Production Techniques. (0-3). Credit 1. I, II, S

Continuation of M.E. 309. Machining of metals with both standard and production machine tools. Manufacture of interchangeable parts, jigs, fixtures, and fixed gages. Prerequisite: M.E. 309.

### 313. Engineering Mechanics. (3-0). Credit 3. I, II, S

Continuation of M.E. 212, including kinematics, both graphical and algebraic solutions of relative linear velocities and accelerations, kinetics, dynamics of translation and rotation, work, energy, impact, momentum, and balancing. Prerequisite: M.E. 212.

### 323. Thermodynamics. (4-0). Credit 4. I, II

Thermodynamics of ideal and non-ideal gases, including non-flow and steady-flow processes; internal combustion engines; gas compressors; combustion; vapors and vapor mixtures, boilers, and vapor cycles; general thermodynamic relations. Prerequisites: Math. 122 or 210; Phys. 219.

### 327. Thermodynamics. (3-0). Credit 3. I, II, S

Thermodynamics of gases, vapors, and liquids in various non-flow and steady-flow processes; internal combustion engines; gas compressors; power plant equipment; closed and open systems of various types. Prerequisites: Math. 122 or 210; Phys. 219.

### 328. Thermodynamics. (3-0). Credit 3. I, II, S

Continuation of M.E. 327, covering gas mixtures, variable specific heats, turbines, modern power plant cycles, combustion, refrigeration, air conditioning, non-ideal gases; general thermodynamic relations. Prerequisite: M.E. 323 or 327.

**337. Kinematic Drawing. (0-3). Credit 1. I**

Problems and drafting involving linkages, centros, relative linear velocities, cams and gears. Designed especially to supplement kinematics of motion included in course of dynamics. Prerequisite: M.E. 313 or registration therein.

**338. Kinematics and Machine Design. (2-3). Credit 3. I, II, S**

The kinematics is designed to accompany or follow the course in dynamics and to include analytical, graphical, and design applications of certain topics from dynamics. The machine design is designed to effect the transition from strength of materials to stress analysis and design of load bearing machine parts. Prerequisites: C.E. 305 and M.E. 313 or registration therein.

**340. Physical Metallurgy. (2-3). Credit 3. I, II, S**

Fundamentals of physical metallurgy; structure of matter; physical and mechanical properties; corrosion; metals and alloy systems; precipitation hardening; heat treatments of steels; stainless steels, light metals, copper alloys, and miscellaneous commercial alloys, metallurgy of fabrication methods. Laboratory includes demonstration and participation in metallographic techniques, physical testing, cold working and heat treatment. Prerequisites: Chem. 102 or 104; C.E. 305 or registration therein.

**344. Fluid Mechanics. (3-0). Credit 3. I, II, S**

Application of laws of statics, buoyancy, stability, energy, and momentum to behavior of ideal and real fluids. Study of dimensional analysis and similitude and their application to flow through ducts and piping, dynamic lift and related problems. Prerequisites: M.E. 313, and 323 or 327.

**346. Fluid Mechanics and Heat Transfer. (3-0). Credit 3. I, II**

Application of mechanics and thermodynamics to behavior of ideal and real fluid. Study of fundamental laws relating to heat flow. Prerequisites: M.E. 313, 323 or 327.

**403. Engineering Laboratory. (1-3). Credit 2. I, II, S**

Study and calibration of instruments used in laboratory work and simple tests of engines, pumps, and flow devices. Engineering analysis and analogue theory are stressed. Calculations and written reports on investigations and results obtained. Prerequisites: M.E. 323 or 327 and registration in M.E. 344 or Ch.E. 304.

**404. Engineering Laboratory. (1-3). Credit 2. I, II, S**

Continuation of M.E. 403 with more advanced work with analog computer and in analysis of steam and internal combustion engines, turbines, fans, refrigeration machinery, pumps, and various flow devices. Prerequisites: E.E. 331; M.E. 328, 344, 403.

**409. Structure and Properties of Alloys. (2-3). Credit 3. I**

Continuation and intensification of subject matter of M.E. 340. Laboratory exercises include metallographic studies and heat treatments by individual students. Prerequisites: M.E. 340; Phys. 220.

**410. Internal Combustion Engines. (3-0). Credit 3. I, II**

Thermodynamics and cycles for internal combustion engines and gas turbines, including fuels and combustion. Performance characteristics of various types of engines. Prerequisite: M.E. 323 or 327.

**414. Steam and Gas Turbines. (3-0). Credit 3. I**

Analysis of gas turbine cycles, high speed gas flow, turbine and compressor kinematics and thermodynamics; study of steam turbines and of special cycles. Prerequisites: M.E. 328, 344.

**417. Power Engineering. (3-0). Credit 3. I, II, S**

Application, operation, and performance of all types of power plant equipment. Selection and arrangement of such equipment from standpoint of economics. Prerequisites: M.E. 328, 461.

**432. Automotive Engineering. (3-0). Credit 3. II**

The modern automobile, its power plant, fuels, performance, vibration, dynamic balancing, electrical equipment, braking systems, and construction from engineering standpoint. Prerequisites: M.E. 313, and 323 or 327.

**436. Air Conditioning and Refrigeration. (3-0). Credit 3. II**

Application of principles of thermodynamics to equipment and methods of practical production of refrigeration. Thermodynamics of conditioning air. Selection of equip-

ment, piping, and dust layouts for heating, ventilating, and air conditioning. Prerequisite: M.E. 323 or 328.

**445. Machine Design. (2-3). Credit 3. I, II**

Theory and practice of machine design applied to various machine parts, such as columns, screws, shafts (considering combined stresses), bearings, brakes, springs, and complete machines. Prerequisite: M.E. 310, 338, 340.

**446. Machine Design. (2-3). Credit 3. I, II**

Theory and practice of machine design applied to problems encountered in transmission of power by means of belts, chains, and gears. Prerequisite: M.E. 445 or registration therein.

**457. Engineering Analysis. (3-0). Credit 3. II**

Mathematical and experimental methods of solving problems in various fields of engineering. Dimensional analysis, representation of analysis of experimental data, graphical and numerical solution of differential equations, analogies and computers. Prerequisites: Math. 308; senior classification in engineering.

**459. Mechanical Vibration. (3-0). Credit 3. I, II, S**

Basic theory of vibrating systems with single and multiple degrees of freedom and principles of transmission and isolation of vibrations. Prerequisites: Math. 308; M.E. 313.

**461. Heat Transfer. (3-0). Credit 3. I, II, S**

Study of conduction, convection, and radiation separately and in combination; steady and unsteady states; mathematical treatments; graphical and numerical solutions, dimensional analysis. Prerequisites: Math. 308; M.E. 344.

**481. Seminar. (0-2). Credit 1. I, II**

Oral presentation of selected topics from current literature of the field. Technical films showing practical application of theories of engineering and manufacturing processes. Lectures from industrial representatives. Prerequisite: Senior classification.

**485. Advanced Problems in Mechanical Engineering. Credit 1 to 6. I, II, S**

Special problems in various phases of mechanical engineering assigned to individual students or to groups. Readings assigned, and frequent consultations held. Prerequisites: By permission and senior classification in mechanical engineering.

**599. Mechanics for College Teachers: Statics. (4-0). Credit 4. S**

Forces and couples, force systems, resultants, components, equilibrium, frame structures, center of gravity, moment of inertia, graphical methods, teaching techniques in both analytical and vector methods; associated seminar. Prerequisites: Graduate classification; approval of the Heads of the Education and Mechanical Engineering Departments.

## FOR GRADUATES

**600. Mechanics for College Teachers: Dynamics. (3-0). Credit 3. S**

Kinematics of absolute and relative displacement, velocity, and acceleration by graphical, algebraic, and vector methods to include Coriolis' component; kinetics and dynamics of translation and rotation, work, energy, impact, momentum, balancing; teaching techniques, associated seminar. Prerequisites: Math. 685 (2 hours); M.E. 599.

**601. Advanced Machine Design. (4-0). Credit 4. II**

Study of special design problems in mechanical engineering such as design of piping systems subjected to thermal expansion, theory of lubrication, curved beams and flat plates. Prerequisites: Math. 308; M.E. 445 or equivalent.

**603. Power Plants. (4-0). Credit 4. II**

Design of central and isolated power plants with special attention to over-all economic operation. Prerequisite: M.E. 417.

**605. Engineering Analysis. (4-0). Credit 4. I, S**

Study of analytical, graphical, and approximate methods of solving problems common to engineering; dimensional analysis and model study; design of experiments; statistical analysis and interpretation of test data including derivation of empirical equations. Prerequisite: Math. 308.



**613. Engineering Dynamics. (4-0). Credit 4. II**

Study of dynamics of particles and of rigid bodies; virtual work principle, Lagrange's and Euler's equations of motion, and Hamilton's principle applied to engineering problems. Prerequisites: Math. 601; M.E. 313.

**615. Advanced Engineering Thermodynamics. (4-0). Credit 4. I**

Theories of thermodynamics and their application to more involved problems in engineering practice. Second law analysis and statistical theory emphasized. Prerequisite: M.E. 328.

**616. Heat Transmission. (4-0). Credit 4. II**

Fundamental laws relating to heat flow, application of these laws to engineering materials used in various industrial processes; study of recent developments by reference to current literature. Prerequisites: Math. 601; M.E. 605.

**617. Mechanical Vibrations. (4-0). Credit 4. I, S**

Theory of vibrations of machines and structures. Vibration of elastic bodies and of non-linear systems. Prerequisites: Math. 308; M.E. 313.

**618. Advanced Air Conditioning. (4-0). Credit 4. II**

Thermodynamics of air-vapor mixtures as applied to air conditioning. Design and selection of equipment with emphasis on system planning, air distribution, controls, noise and vibration elimination, costs and economics. Prerequisite: M.E. 436.

**620. Experimental Stress Analysis. (3-3). Credit 4. I**

Study of photoelasticity, electric strain gauges, stresscoat. Prerequisite: Math. 308 or registration therein.

**621. Fluid Mechanics. (4-0). Credit 4. I**

Study of flow problems encountered in design of water, gas, and steam turbines; centrifugal and axial-flow pumps and compressors. Prerequisites: Math. 308; M.E. 344.

**631. Jet Propulsion. (4-0). Credit 4. I**

Study of fluid mechanics and thermodynamics of turboprop engines, ramjets, turbojets, rocket motors, and electric propulsion systems. Where applicable, analysis of performance of these systems will be made. Prerequisites: Graduate classification in engineering; approval of Department Head.

**640. Ferrous Metallurgical Design. (3-3). Credit 4. II**

A detailed study of the phase transformations in steel, the resulting changes in mechanical properties, the peculiarities of the steels, and their influence upon the design of machine elements. Prerequisites: M.E. 340, 409 or its equivalent.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Content will be adapted to interest and needs of group enrolled.

**691. Research. Credit 1 or more each semester. I, II, S**

Methods and-practice in mechanical engineering research for thesis or dissertation. (See S.M. 601, 602, 603, 604, 605, 606, 607, 608, and 609 for descriptions of related courses.)

## Department of Military Science

### UNITED STATES ARMY

Professor: Colonel Baker; Associate Professors: Lieutenant Colonels Hertzog, Hotchkiss, Matchin, Vernon; Majors Bell, Bolte, Gordon, Kirmse, Zipp; Assistant Professors: Captains Carmichael, Denny, Lorms

### Basic Course of Military Science

**121. First Year Military Science. (0-2). Credit 1. I**

Individual weapons and marksmanship: Introduction to individual weapon presently used in Army with emphasis placed on marksmanship training, fundamentals of this training, safety principles, and good shooting habits. Organization of Army and ROTC: Providing understanding of Army and orientation on ROTC. Leadership laboratory: Leadership training, drill experience, and development of characteristics of leadership through progressive training in drill and command.

**122. First Year Military Science. (0-2). Credit 1. II**

U. S. Army and National Security: Providing understanding of missions and responsibilities of U. S. Army as member of National Defense Team and emphasizing cadet's personal responsibility as citizen and leader. Leadership laboratory: Continuation of M.S. 121.

**221. Second Year Military Science. (0-3). Credit 1. I**

American military history; Providing survey of American military history from origin of U. S. Army to present with emphasis on factors which led to organizational, tactical, logistical, operation, strategical, social and similar patterns found in present-day Army. Leadership laboratory: Progressive leadership training in drill and command emphasizing functions, duties, and responsibilities of junior leaders (Squad leaders, guidon bearers and platoon sergeants).

**222. Second Year Military Science. (0-3). Credit 1. I, II**

Map and aerial photograph reading: Application of basic principles of map reading emphasizing terrain appreciation and evaluation, marginal information, military and topographic map symbols, methods of orientation and resection, military grid reference systems, classes of aerial photography. Introduction to operations and basic tactics: Review of organization of basic military teams and understanding of duties, responsibilities, and methods of employment of basic military units. Introduction to counterinsurgency operations to acquaint cadet with this area. Leadership laboratory: Continuation of M.S. 221.

**Advanced Course of Military Science****321. First Year Advanced Military Science. (2-2). Credit 3. I**

Leadership: Responsibilities and basic qualities of leader, human behavior, and adjustment of Army life, objectives of leadership, leadership principles, leadership techniques, functions of leader and special problems of military leadership. Branches of the army: orientation on role of various branches of Army and their function in overall mission of Army. Military teaching principles: Developing understanding of principles, methods, and techniques fundamental to military instruction, and providing opportunities for cadet to develop skill in preparation, presentation, and evaluation of instruction. Leadership laboratory: Special attention given to further developing leadership potentials by encouraging Advanced Course cadets to participate in planning and conducting of drills and ceremonies.

**322. First Year Advanced Military Science. (2-2). Credit 3. II**

Small unit tactics and communications: Review and application of principles of offensive and defensive combat to units of infantry division battalion; conduct of counterinsurgency and guerrilla warfare training; familiarization of principles of communications. Familiarizing cadets with administrative procedures and general conduct of training at ROTC Summer Camp. Leadership laboratory: Continuation of M.S. 321.

**421. Second Year Advanced Military Science. (2-2). Credit 3. I**

Army administration: Providing cadet with basic concepts and fundamentals of Army administration and mess management. Operations: Providing understanding of staff organizations, using division staff as model; staff duties; forms; records; reports; and orders of staff. Logistics: Providing cadet with fundamental knowledge of supply and movement of small units. Leadership laboratory: Drill and command with emphasis placed on cadet's responsibility as leader.

**422. Second Year Advanced Military Science. (2-2). Credit 3. II**

Military Law: Introducing cadet to fundamental concepts of military justice in Armed Forces of U. S., and teaching basic principles and methods of procedures for cases. Role of U. S. in world affairs: Preparing future officer for active service by orientation in geographical and economic factors, their influence on division of peoples into nations, and causes of wars. Service orientation: Providing senior cadet an orientation on service life for future officers. Map reading: Review of principles of maps and aerial photograph reading in order to further prepare cadet for attendance at Officer Branch Basic Course upon his entry on active duty. Leadership laboratory: Continuation of M.S. 421.

**NOTE:** During the First Year of Basic Military Science, 30 contact hours of an acceptable academic subject will be substituted for a like number of military subject contact hours. (Normally this subject will be English 103).

In both the First and Second Years of Advanced Military Science, 45 contact hours of an acceptable academic subject will be substituted for a like number of military subject contact hours. Since the academic subject substituted depends on the individual cadet's academic major, the Military Science Department will assign each subject to the cadet at the time of registration.

### Department of Modern Languages

Professors Breitenkamp, Dabbs (Head), Skrivanek, Woolket; Associate Professor Comfort; Instructors Evans, Gottschalk, Kent, Mayeux, Quinn

Foreign languages, in addition to their unquestioned cultural value, have a utilitarian value of great importance for those expecting to engage in research or purely practical pursuits. It is, therefore, advisable when possible for students to take up such a language during their undergraduate studies and thereby have the use of it when they begin advanced work in agriculture, engineering, or in pure science. Otherwise, as often happens, their specialization may be hampered or delayed. A language laboratory is available for those interested in developing a command of the spoken language.

#### 100. Spoken English for Foreign Students. (3-0). Credit 3. I, II, S

Intensive class drill; individual laboratory work in comprehension, and practice in correct pronunciation by means of tape recordings; study of idiomatic and colloquial expressions.

#### 101. Beginning French. (3-0). Credit 3. I

Study of standard elementary grammar with oral and reading exercises; early attention given to background for conversation. One half of class preparation will be done in language laboratory.

#### 102. Beginning French. (3-0). Credit 3. II

Continuation of M.L. 101. Exercises designed to develop conversational ability. One half of class preparation will be done in language laboratory. Prerequisite: M.L. 101 or equivalent.

#### 103. Beginning German. (3-0). Credit 3. I, II, S

Study of standard elementary grammar with emphasis on modern usage; elementary readings begun at mid-semester; elementary conversation. One half of class preparation will be done in language laboratory.

#### 104. Beginning German. (3-0). Credit 3. I, II, S

Continuation of M.L. 103. Exercises designed to develop conversational ability. One half of class preparation will be done in language laboratory. Prerequisite: M.L. 103 or equivalent.

#### 105. Beginning Spanish. (3-0). Credit 3. I, II, S

For beginners. Standard elementary grammar with oral and reading exercises; early attention given to background for conversation. One half of class preparation will be done in language laboratory.

#### 106. Beginning Spanish. (3-0). Credit 3. I, II, S

Continuation of M.L. 105. Extensive written and oral exercises. Oral exercises designed to develop conversational ability. Part of class preparation will be done in language laboratory. Prerequisite: M.L. 105 or equivalent.

#### 109. Beginning Russian. (3-0). Credit 3. I

Study of standard elementary grammar with oral, written, and reading exercises; early attention given to background for conversation. A certain amount of class preparation will be done in language laboratory.

#### 110. Beginning Russian. (3-0). Credit 3. II

Continuation of M.L. 109; continued study of elements of grammar; oral exercises. Part of class preparation will be done in language laboratory. Prerequisite: M.L. 109 or equivalent.

#### 201. Intermediate French. (3-0). Credit 3. I

French readings of average difficulty; advanced conversation with composition. One half of class preparation will be done in language laboratory. Prerequisite: M.L. 102 or equivalent.



**202. Intermediate French. (3-0). Credit 3. II**

Continuation of M.L. 201 with increased conversational material. One half of class preparation will be done in language laboratory. Prerequisite: M.L. 201 or equivalent.

**203. Intermediate German. (3-0). Credit 3. I, II**

Introduction to German readings of average difficulty. Review of grammar; composition; practice in conversation. Prerequisite: M.L. 104 or equivalent.

**204. Intermediate German. (3-0). Credit 3. I, II**

Continuation of M.L. 203 with increased conversational material. Some scientific selections included in class readings. Prerequisite: M.L. 203 or equivalent.

**205. Intermediate Spanish. (3-0). Credit 3. I, II**

Completion of grammar study, followed by intensive practice. Part of class preparation will be done in language laboratory. Prerequisite: M.L. 106 or two years of high-school Spanish.

**206. Intermediate Spanish. (3-0). Credit 3. I, II**

Continuation of M.L. 205. Reading of standard literary works. Part of class preparation will be done in language laboratory. Prerequisite: M.L. 205 or equivalent.

**209. Intermediate Russian. (3-0). Credit 3. I**

Review of grammar; selected readings based on everyday subjects; supplementary material to develop self-expression and recognition ability. Prerequisite: M.L. 110 or equivalent.

**210. Intermediate Russian. (3-0). Credit 3. II**

Continuation of M.L. 209. Readings taken from standard works. Prerequisite: M.L. 209 or equivalent.

**301. French Literature to 1800. (3-0). Credit 3. I**

Survey of French literature to end of eighteenth century. Selected readings; main literary currents of period. Class lectures in French. Assigned readings and topics for class reports. Prerequisite: Twelve hours of French or equivalent.

**302. French Literature, 1800 to the Present. (3-0). Credit 3. II**

Survey of nineteenth and twentieth centuries. Readings from representative authors; main literary currents of period. Lectures and class reports in French. Prerequisite: Twelve hours of French or equivalent.

**303. Classical German Literature. (3-0). Credit 3. I**

Study of classical period of German literature, including works of Lessing, Schiller, and Goethe. Reports and term papers. Prerequisite: M.L. 204 or approval of Department Head.

**304. Twentieth Century German Literature. (3-0). Credit 3. II**

Study of twentieth-century German literature. Selected works by representative writers. Reports and term papers. Prerequisite: M.L. 204 or approval of Department Head.

**305. Modern Spanish-American Drama. (3-0). Credit 3. I**

Study of representative contemporary plays of Mexico. Economic, social, and cultural background of Spanish American republics. Conducted largely in Spanish. Written reports in Spanish; term papers. Prerequisite: M.L. 206 or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**306. Modern Spanish-American Drama. (3-0). Credit 3. II**

Continuation of M.L. 305. Authors and plays of South America. Prerequisite: M.L. 206 or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**309. Advanced Russian. (3-0). Credit 3. I**

Selections from Russian literature and scientific publications. Special attention to participial constructions; complex sentences. Conversation practice. Laboratory for oral preparation. Prerequisite: M.L. 210 or approval of Department Head.

**310. Advanced Russian. (3-0). Credit 3. II**

Continuation of M.L. 309. Selections from current literary, journalistic, and scientific periodicals. Partly conducted in Russian. Laboratory for advanced conversation. Prerequisite: M.L. 309 or approval of Department Head.

**325. Public Speaking in Spanish. (1-2). Credit 2. I**

Training in preparation and delivery of talks in Spanish. Talks are recorded for remedial work in laboratory. Prerequisite: Completion of any 300 course in Spanish, or approval of the Department Head.

**326. Public Speaking In Spanish. (1-2). Credit 2. II**

Continuation of M.L. 325 with round-table discussions and impromptu speeches. Prerequisite: Completion of any 300 course in Spanish, or approval of Department Head.

**335. Spanish-American Novel. (3-0). Credit 3. I**

Study of representative contemporary novels of Mexico. Term papers in Spanish. Prerequisite: M.L. 206 or equivalent. (Offered in 1964-65 and in alternate years thereafter.)

**336. Spanish-American Novel. (3-0). Credit 3. II**

Continuation of M.L. 335. Authors and novels of South America. Prerequisite: M.L. 206 or equivalent. (Offered in 1964-65 and in alternate years thereafter.)

**385. Readings in French. Credit 1 or 2. I, II**

Individual supervision of readings. Written and oral reports and semester examination; no class meetings. Prerequisites: Nine hours of French; junior classification; approval of Department Head.

**386. Readings in German. Credit 1 to 3. I, II**

Individual supervision of readings selected for each student separately. Written and oral reports and semester examination; no class meetings. Prerequisites: Nine hours of German; junior classification; approval of Department Head.

**389. Readings in Czech. Credit 1 to 3. I, II**

Individual supervision of readings selected for each student separately. Written and oral reports and a semester examination; no class meetings. Prerequisites: Two years of high-school Czech or equivalent; junior classification; approval of Department Head.

**401. Introduction to Scientific French. (3-0). Credit 3. S**

Designed to assist graduate student prepare himself to read scientific material with sufficient adequacy to pass foreign language examination requirement for the Ph.D. degree. Technical vocabulary and translation.

**402. Readings in Scientific French. (3-0). Credit 3. S**

Continuation of M.L. 401. Reading and translation of material relating to various sciences. Designed to develop technical vocabulary and facility in reading scientific French. Prerequisite: M.L. 401 or approval of Department Head.

**403. Introduction to Scientific German. (3-0). Credit 3. I, S**

Designed to assist graduate students read scientific material with sufficient adequacy to pass foreign language examination requirement for Ph.D. degree. Technical vocabulary; translation; reading material in fields of various sciences.

**404. Readings in Scientific German. (3-0). Credit 3. II, S**

Continuation of M.L. 403. Translation of material relating to various sciences. Designed to develop technical vocabulary and facility in reading scientific German. Prerequisite: M.L. 403 or approval of Department Head.

**405. Spanish Literature to 1700. (3-0). Credit 3. I**

Origins of Spanish literature, literary movements, leading writers. Class readings of selected examples of literary types. Written reports on outside reading. Prerequisite: Six hours of 300-level courses in Spanish or equivalent.

**406. Spanish Literature, 1700 to the Present. (3-0). Credit 3. II**

Literary movements since 1700. Introduction to best-known writers and their works. Reports in Spanish. Prerequisite: Six hours of 300-level courses in Spanish or equivalent.

**409. Introduction to Scientific Russian. (3-0). Credit 3. I, S**

Designed to assist graduate student prepare himself to read scientific material. Reading material in fields of various sciences. Intended for Ph.D. candidates.

**410. Readings in Scientific Russian. (3-0). Credit 3. II, S**

Continuation of M.L. 409. Selected material relating to various sciences. Designed to develop technical vocabulary and facility in reading scientific Russian. Prerequisite: M.L. 409 or approval of Department Head. Intended for Ph.D. candidates.

**Department of Naval Science****UNITED STATES NAVY**

Associate Professor: Lieutenant Ward (Head); Assistant Professor: Lieutenant (jg) Wilkinson; Instructors: Chief Yeoman Berryman, Chief Gunner's Mates: Bryant, Gann

The Naval Science Department administers prescribed naval subjects within academic standards set by the Chief of Naval Personnel. Areas of instruction which are duplicated by the Academy are not taught by the Naval Science Department. Each cadet who completes the Naval Science courses and is otherwise qualified becomes eligible for, and may be granted, an inactive commission as Ensign, U. S. Naval Reserve, upon graduation.

The objectives of the Naval Science Department are to provide the cadet with a well-rounded course in basic naval subjects; to develop an understanding of naval science and a knowledge of naval practice; and to develop, by precept and example, the psychology and technique of leadership.

**109. Orientation and Sea Power. (0-2). Credit 1. I**

Study of naval organization, customs, traditions, standard shipboard organization, types and characteristics of naval vessels, and elements of various types of naval warfare.

**110. Orientation and Sea Power. (0-2). Credit 1. II**

Continuation of N.S. 109.

**209. Sea Power. (3-0). Credit 3. I**

Stimulates interest in naval history and appreciation of contribution of sea power to past, present, and future progress of United States, stressing influence of sea power on global history.

**210. Naval Weapons. (3-0). Credit 3. II**

Introduction to naval weapons to familiarize cadet with nomenclature and types of weapons in use today. Includes explosives, armor, guns and gun mounts, power drives, basic principles of rockets and guided missiles, fire control problem and associated equipment, relation of radar and CIC equipment to gunnery, anti-submarine warfare, and introduction to space technology and nuclear warfare.

**309. Naval Machinery. (3-0). Credit 3. I**

Offered to deck cadets to afford basic understanding of ship stability, naval engineering including main propulsion plants (steam, nuclear, and internal combustion) with emphasis being placed upon fundamental principles. Familiarizes cadet with entire shipboard engineering plant, including electrical systems, refrigeration, distillation and miscellaneous equipment, and with administration and organizational concepts in field of naval engineering.

**310. Naval Operations. (3-0). Credit 3. II**

Acquaints student with those responsibilities which face him in shipboard operations such as relative motion, tactical communications and instructions, and rules of nautical road so that he may qualify in bridge and CIC watch billets afloat with minimum additional training; affords basic understanding of fleet communications; introduces electronic counter-measures; affords basic understanding of naval operations.

**311. Navigation. (3-0). Credit 3. I**

Offered to engineer cadets to enable cadet to acquire understanding of theory and technique of terrestrial and celestial navigation.

**410. Principles of Naval Leadership. (3-0). Credit 3. II**

Built upon foundation of General Order No. 21 which defines naval leadership as art of accomplishing Navy's mission through people, based on three precepts; personal example, good management practice, and moral responsibility.



## Department of Nuclear Engineering

Professor Cochran (Head); Associate Professor Gibson; Assistant Professors Bishop, Emon, Kohler, Randall; Instructors Poulson, Quddus

### 401. Nuclear Engineering. (3-0). Credit 3. I

Nuclear reactions and concepts fundamental to reactor engineering. Prerequisite: Senior classification.

### 402. Industrial Applications of Radioisotopes. (2-3). Credit 3. II

Interaction of radiation with matter. Behavior of various nuclear radiation detectors studied both theoretically and experimentally in laboratory. Properties of radioisotopes useful to industry are considered and evaluated from engineering point of view. Prerequisites: Math. 308; senior classification.

### 404. Nuclear Engineering. (3-0). Credit 3. II

An introduction to neutron diffusion theory as applied to nuclear reactors. Conditions for criticality and control of fission process. Elements of radiation production, shielding and heat generation in nuclear reactor. Prerequisites: Math. 308; N.E. 401.

### 409. Radiological Safety. (2-0). Credit 2. I, II, S

Lectures and demonstrations concerning interactions of nuclear radiations with matter and biological systems. Emphasis given to theory and practice of radiation dosimetry as applied to radiation protection. Prerequisites: Math. 307; Phys. 220; or approval of instructor.

## FOR GRADUATES

### 601. Nuclear Reactor Analysis. (4-0). Credit 4. I

Neutron balance and cycle. Neutron slowing-down and diffusion in finite systems. Fermi Age and multigroup criticality for bare, homogeneous cores. Reflected homogeneous and heterogeneous reactor. Reactor kinetics. Prerequisites: Math. 308, 601 or registration therein.

### 602. Nuclear Reactor Analysis. (4-0). Credit 4. II

Introductory transport theory, multigroup slowing-down diffusion theory for bare and reflected cores, thermal utilization, resonance escape, fast fission, heterogeneous lattices, temperature coefficients, control rods, reactor kinetics and perturbation theory. Prerequisites: Math. 601; N.E. 601.

### 605. Nuclear Measurements Laboratory. (2-3). Credit 3. I

Basic techniques of nuclear measurements discussed and practiced. Behavior of neutrons in multiplying and non-multiplying media observed. Extensive use made of nuclear reactor. Prerequisite: N.E. 601 or registration therein.

### 606. Reactor Experimentation. (2-3). Credit 3. II

Extension of N.E. 605. Control rod and power calibrations are performed. Effects of scattering, absorption, and moderation on the reactor are determined. Reactor core is disassembled and a critical experiment performed. Prerequisites: N.E. 602 or registration therein; N.E. 605.

### 608. Thermonuclear Engineering. (3-0). Credit 3. I, S

Fundamentals relative to use of fusion reaction as energy source. Transport theory for ionized gases. Liouville and Boltzmann equations. Macroscopic conservation laws and magnetohydrodynamics. Instabilities. Confinement and heating problems. Diagnostics.

### 610. Design of Nuclear Reactors. (3-0). Credit 3. S

Applies fundamentals of nuclear physics and reactor theory with engineering fundamentals to design of nuclear reactors. Prerequisite: N.E. 602 or registration therein.

### 612. Radiological Safety and Hazards Evaluation. (3-0). Credit 3. II

State and Federal regulations concerning radioactive materials. Radiation safety as applied to accelerators, nuclear reactors and radioactive byproducts. Rigorous methods of analysis applied to computation of biological radiation dose and dose rates from various sources and geometries. Radiation effects on physical systems. Prerequisites: Math. 601; N.E. 409; or approval of instructor.

**615. Nuclear Radiation Detection. (3-0). Credit 3. I**

Interaction of radiation with matter and behavior of ion pairs in presence of electric fields. Theory of operation for radiation detection devices. Prerequisite: Math. 307.

**618. Nuclear Control Systems. (3-0). Credit 3. II**

Fundamentals of servocontrol developed and applied to nuclear reactor. Safety aspects of reactor control and operational problems. Prerequisite: N.E. 602 or registration therein.

**621. Nuclear Metallurgy. (3-0). Credit 3. II**

Physical and metallurgical properties of metals used in nuclear reactors and reasons for their use. Prerequisite: M.E. 409.

**622. Nuclear Power Plant Design and Analysis. (3-0). Credit 3. II**

Designed to present application of nuclear reactor systems to field of power production, utilizing general fields of thermodynamics and heat transfer, along with special problems arising from nuclear system. Prerequisites: M.E. 323 or 328; N.E. 601.

**623. Analytical Nuclear Engineering I. (3-0). Credit 3. I**

Unified treatment of mass, momentum, and energy transport with applications to nuclear engineering sources. Velocity and temperature distributions in laminar and turbulent flow. Liquid metal heat transfer. Flow and thermal stability. Prerequisites: Math. 622 or 625; N.E. 610.

**624. Analytical Nuclear Engineering II. (3-0). Credit 3. II**

Unified analytical treatment of heat conduction in solids and thermal stress phenomena with application to nuclear energy sources. Transient heat conduction in solids. Isothermal elasticity. Thermoelasticity. Viscoelasticity. Plasticity. Prerequisites: Math. 622 or 625; N.E. 610.

**625. Nuclear Reactor Theory. (4-0). Credit 4. I**

Advanced treatment of neutron transport theory. Methods of solution of integro-differential and integral Boltzmann equations and their adjoints. Multigroup diffusion and transport theory. Prerequisites: Math. 602 or 617; N.E. 602.

**626. Nuclear Reactor Theory. (4-0). Credit 4. II**

Continuation of N.E. 625. Variational principles for discrete and continuous eigenvalues. Milne problem and Wiener-Hopf technique. Serber-Wilson and Feynman methods. Spatially independent and dependent slowing-down theory. Prerequisite: N.E. 625.

**681. Seminar. (1-0). Credit 1. I, II**

Special topics in nuclear engineering not covered by formal course work. Whenever possible, guest lecturers will discuss topics which they have personally investigated. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 4 each semester. I, II**

Offered to enable students to undertake and complete limited investigations not within their thesis research and not covered by any other courses in curriculum. Prerequisite: Graduate classification.

**691. Research. Credit 1 or more each semester. I, II, S**

Research toward thesis or dissertation.

## Department of Oceanography and Meteorology

Professors Hood, Leipper, Moyer, Pequegnat (Acting Head), Reid; Associate Professors Brundidge, Clayton, Cochrane, Franceschini, Huebner, Ray, Thompson; Assistant Professors Angino, Bryant, Clark, Cooper, El-Sayed, Griffiths, Henry, Nowlin, Sanford, Zeitoun; Instructors Cobb, McDaniel, Randerson, Runkles, Runnels

### METEOROLOGY

**302. Weather Reports and Forecasting. (3-0). Credit 3. I**

Global weather reporting, codes and data transmission, radio-facsimile weather maps; features of circulation; synoptic weather analysis; avoiding storms at sea. (For students in Texas Maritime Academy)

**305. General Meteorology. (3-0). Credit 3. I, II**

Introductory course in composition, structure, and behavior of atmosphere. Emphasis on fundamental processes and descriptions. Prerequisites: Registration in Math. 307; Phys. 202 or 219.

**315. Meteorological Instruments and Observations. (3-3). Credit 4. I, II**

Design and accuracy of meteorological instruments; weather observations and codes; data transmission; meteorological charts and diagrams; plotting and analysis of data. Prerequisites: Math. 121 or 209; Phys. 202 or 219.

**324. Physical and Regional Climatology. (3-0). Credit 3. I, II**

Climatic causes; classification and geographical distribution of climates; long-term climatic variations; study of effects of climate on life. Prerequisite: Met. 305 or approval of instructor.

**335. Atmospheric Statics and Thermodynamics. (2-0). Credit 2. I, II**

Thermodynamics of dry, moist, and saturated air applied to atmospheric analysis; Thermodynamic diagrams; hydrostatic equilibrium and stability. Prerequisites: Math. 122 or 210; Phys. 202 or 219.

**336. Atmospheric Motions. (3-0). Credit 3. II, S**

Kinematics; conservation equations; equations of motion; geostrophic and accelerated motion; streamlines; trajectories; circulation and vorticity theorem; wave dynamics. Prerequisites: Math. 307; Met. 335.

**425. Methods in Climatology. (3-3). Credit 4. I, II**

Sampling and analysis of time series of atmospheric parameters; objective forecasting; punched card techniques; significance and limitations of results. Prerequisite: Met. 324 or approval of instructor.

**435. Dynamic Meteorology. (3-0). Credit 3. I**

Continuation of Met. 336. Application of vorticity equation; movement of barotropic and baroclinic systems; numerical weather prediction; energy transformation. Prerequisites: Math. 308; Met. 336.

**445. Atmospheric Physical Processes. (3-0). Credit 3. I, S**

Physics of heat, moisture, and momentum transfer; radiation, evaporation, condensation, advection, convection, turbulence, and diffusion; their consequences upon weather. Prerequisite: Met. 336.

**446. Physical Meteorology. (3-0). Credit 3. I, II, S**

Fog, cloud, and precipitation physics; thunderstorms; atmospheric electricity; atmospheric optical and acoustical phenomena. Prerequisite: Met. 445.

**451. Fundamentals of Meteorological Analysis. (1-9). Credit 4. II, S**

Principles and techniques of synoptic weather analysis in three dimensions; detailed studies of structure and development of extratropical weather systems. Prerequisite: Met. 336 or registration therein.

**452. Weather Analysis and Prognosis. (1-6). Credit 3. I, S**

Continuation of Met. 451, with study of time continuity and vertical consistency; tropopause and jet streams; major and minor waves; short- and long-range prognostic techniques. Prerequisite: Met. 451.

**453. Synoptic Meteorology. (1-6). Credit 3. I, II, S**

Continuation of Met. 452, with emphasis on interpretation of weather events from analyzed and prognostic charts; current weather forecasting and briefing. Prerequisite: Met. 452.

**465. Agricultural Meteorology. (2-0). Credit 2. I**

Study of principles of meteorology as related to agriculture, with special emphasis upon climate of surface layer of atmosphere. Prerequisite: Approval of instructor.

**467. Marine Meteorology. (3-0). Credit 3. II**

Interactions between sea and air; energy budget and exchange processes; climatology of global exchanges and restricted area applications. Prerequisite: Approval of instructor.



**475. Radar Meteorology. (3-0). Credit 3. I, II**

Study of theory and practice of radar storm observations. Prerequisite: Met. 445.

**479. Military Applications of Meteorology. (3-0). Credit 3. I, II**

Applications of meteorological knowledge and data to related activities and problems in national defense not under security classification. Prerequisite: Met. 451.

**481. Seminar. (1-0). Credit 1. II**

Presented by students and based upon surveys of the literature.

**485. Problems. Credit 1 to 3. I, II, S**

Offered to enable majors in meteorology to undertake and complete with credit in their particular fields of specialization limited investigations not covered by any other courses in established curriculum.

**FOR GRADUATES****600. Survey of Meteorology. (3-0). Credit 3. II, S**

Survey course in meteorology designed for teachers of secondary school science. Prerequisite: Approval of Heads of Departments of Oceanography and Meteorology and of Education and Psychology.

**615. Instrument Theory and Design. (3-0). Credit 3. II**

Study of modern methods of instrumentation as related to meteorology and allied geophysical fields; their basic concepts, design, use, and inherent errors. Prerequisite: Bachelor of Science degree in science or engineering.

**625. Applied Climatology. (3-0). Credit 3. I**

Practical applications of climate to other disciplines and study of methods used for this coordination. Prerequisite: Met. 425 or approval of instructor.

**636. Dynamic Meteorology. (3-0). Credit 3. II**

Perturbation theory and applications to barotropic and baroclinic systems; current literature topics. Prerequisites: Math 601; Met. 435. (Offered in 1965-66 and in alternate years thereafter.)

**637. Numerical Weather Prediction. (3-0). Credit 3. I**

Numerical solution of hydrodynamical relationships; modeling, smoothing, and filtering; stability; accuracy of solutions. Prerequisites: Math. 417; Met. 435.

**638. Meteorological Simulation. (2-3). Credit 3. I**

Uses of analog computers in research; laboratory practice using general purpose analog computer; application to other disciplines as well as meteorology. Prerequisites: Math. 308; approval of instructor.

**645. Cloud and Precipitation Physics. (3-0). Credit 3. I**

Physics of clouds and precipitation; convection theories; homogeneous and heterogeneous nucleation; precipitation processes; atmospheric electricity; artificial modification. Prerequisites: Met. 446.

**647. Meteorology of the Upper Atmosphere. (3-0). Credit 3. I**

Effects of solar system astrophysical processes and properties on extratropospheric terrestrial atmosphere; composition, structures, and characteristic phenomena. Prerequisite: Bachelor of Science degree in science or engineering.

**648. Cosmic Meteorology. (3-0). Credit 3. II**

Continuation of Met. 647. Properties and processes of interplanetary medium; atmospheres of other planets; cosmological implications in planetary environments. Prerequisite: Met. 647.

**657. Mesometeorology. (2-6). Credit 4. II**

Theory and analysis of mesoscale weather system; relationship of mesoscale systems to larger and smaller scale systems. Prerequisite: Met. 453 or approval of instructor.

**658. Synoptic Meteorology. (2-6). Credit 4. I**

Examination of procedures for analyzing and forecasting macroscale atmospheric

structure; detailed studies of specific phenomena; recent developments. Prerequisite: Met. 453 or approval of instructor.

**665. Micrometeorology. (3-0). Credit 3. II**

Earth-atmosphere interface processes with special emphasis on exchange concepts and resulting modifications to wind, temperature, and moisture. Prerequisites: Math. 308; Met. 445.

**666. Agricultural Meteorology. (3-0). Credit 3. II**

Application of physical concepts of meteorology to problems arising in agriculture, with detailed study of meso- and micro-climates. Prerequisite: Met. 465.

**674. Radar Meteorology. (3-0). Credit 3. II**

Theoretical considerations of principles of electromagnetic propagation; radar applications in cloud physics research. Prerequisite: Math. 601; Met. 475. (Offered in 1964-65 and in alternate years thereafter.)

**676. Hydrometeorology. (3-0). Credit 3. II**

Role of weather and weather processes in land water problems. Prerequisite: Approval of instructor.

**681. Seminar. (2-0). Credit 2. II, S**

Presented by students and based upon their research work and upon surveys of the literature.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Offered to enable majors in meteorology to undertake and complete with credit in their particular fields of specialization limited investigations not covered by any other courses in established curriculum.

**691. Research. Credit 1 or more each semester. I, II, S**

For thesis or dissertation. Topic subject to approval of Department Head.

## OCEANOGRAPHY

**201. Sea and Air Sciences. (1-0). Credit 1. I, II, S**

Oceanography and meteorology as scientific career fields. Features of natural environment which affect man's daily life and activities. Survey course open to all college students.

**401. Introduction to Oceanography. (3-0). Credit 3. I, II, S**

Subject matter survey. Discussion of interdisciplinary relationships between biological, chemical, geological, physical, meteorological, and engineering aspects of field. Typical studies. Prerequisite: Approval of instructor.

**403. Tides, Waves, Currents, Ice. (3-0). Credit 3. II**

Elements of physical oceanography pertaining to marine transportation and navigation. Astronomical and meteorological tides, wind waves and swell, major ocean current systems, sea ice. Prerequisite: Approval of instructor.

## FOR GRADUATES

**601. Research Methods in Oceanography. (1-0). Credit 1. I, II, S**

Selection of research problem for thesis work; planning program of investigation. Prerequisite: General prerequisites for oceanography.

**603. Sea Laboratory Techniques. (0-6). Credit 2. I**

Practice in techniques used regularly aboard ship and in collecting field data; cruise planning and execution; processing and analysis of data. Prerequisite: Approval of instructor.

**610. Physical Oceanography. (3-0). Credit 3. I**

Physics of sea: physical properties; light and sound transmission; heat and water budgets; distribution of temperature and salinity; hydrostatics; oceanic motions; turbulent transfer; water masses. Prerequisite: General prerequisites for oceanography.

**611. Theoretical Physical Oceanography. (3-0). Credit 3. II**

Kinematics and dynamics of fluids; Eulerian and Lagrangian description; thermodynamic considerations of single and multicomponent fluid mixtures; thermal stability; steady circulation. Prerequisites: Math. 601; Ocn. 610 or approval of instructor.

**612. Theory of Ocean Waves. (3-0). Credit 3. II**

Theories of simple harmonic surface waves, capillary waves, and internal waves; wave energy, wave spectra, propagation, modification in shallow water and superposition. Prerequisites: Math. 601; Ocn. 610 or approval of instructor.

**613. Engineering Aspects of Oceanography. (3-0). Credit 3. I**

Engineering applications of ocean wave theories, including long waves; wave spectra; wave generation and practical wave prediction; wave modification; wave forces. Prerequisites: Math. 308; Ocn. 612 or approval of instructor.

**614. Dynamics of the Ocean and Atmosphere. (3-0). Credit 3. I**

Unified linear perturbation theory of rotating stratified fluid with application to ocean and atmosphere; energy considerations; characteristic modes of motion; approximate methods of analysis. Prerequisites: Math. 602; Ocn. 611.

**620. Biological Oceanography. (3-0). Credit 3. II**

Critical analysis of contribution of biological science to our understanding of sea. Discernable interrelationships between organisms and physico-chemical parameters emphasized. Prerequisite: General prerequisites for oceanography.

**621. Biological Oceanography of the Gulf of Mexico. (1-6). Credit 3. I**

Detailed examination of selected aspects of biological oceanography of major importance to Gulf of Mexico. Prerequisite: Undergraduate major in biology or approval of instructor.

**630. Geological Oceanography. (3-0). Credit 3. I**

Survey of marine geology; structure and composition of ocean basins and continental margins; chemical and physical properties of marine sediments. Prerequisite: General prerequisites for oceanography.

**631. Geological Oceanography of the Gulf of Mexico. (3-0). Credit 3. II**

Theory of sediment transport; marine shorelines and processes operating in coastal zones; beach processes; nature of marine sediments. Prerequisite: Undergraduate major in geology or approval of instructor.

**640. Chemical Oceanography. (3-0). Credit 3. II**

Chemical composition and properties of sea water; evaluation of salinity; pH, excess base, and carbon dioxide system in sea; marine nutrients; oxygen and other dissolved gases; organic constituents. Prerequisite: General prerequisites for oceanography.

**641. Chemical Oceanography. (3-0). Credit 3. I**

Selected topics in chemical oceanography including: industrial utilization of sea water; chemical products of marine biota; water freshening; corrosion; photosynthesis and fertility of sea. Prerequisite: Undergraduate major in chemistry or approval of instructor.

**642. Laboratory Techniques in Oceanography. (0-6). Credit 2. I**

Analytical methods for biological, chemical, and geological investigations. Methods concern salinity, alkalinity, nutrients, organic production, photosynthesis, sediment particle size, trace elements. Prerequisites: Ocn. 610, 620, 630, 640 or approval of instructor.

**643. Geochemistry of the Ocean. (3-0). Credit 3. I**

Study of chemistry of elements in lithosphere, atmosphere and hydrosphere with emphasis on marine environment. Prerequisite: Undergraduate major in geology or approval of instructor.

**644. Isotope Geochemistry. (3-0). Credit 3. II**

Study of isotope geochemistry of different elements in nature. Evaluation of various age dating techniques. Prerequisite: Undergraduate major in geology or approval of instructor.



**651. Meteorological Oceanography. (1-3). Credit 2. I**

Large scale ocean-atmosphere interaction. Ocean emphasis. Interaction in relation to fog, hurricanes, water and air mass modification, and elements of circulations of air and water. Prerequisite: Met. 445 or Ocn. 610.

**652. Ocean Boundary Layer Problems. (3-0). Credit 3. I**

Theory of turbulent transfer of momentum, heat and moisture; mechanics of turbulence; dispersion; methods of analysis of stochastic time sequences. Prerequisites: Math. 414 or equivalent; Ocn. 611.

**681. Seminar. (2-0). Credit 2. I**

Presented by students and based upon their research work and upon surveys of literature.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Special topics to suit small group requirements. Deals with problems not within thesis research and not covered by any other course in established curriculum. Prerequisite: General prerequisites for oceanography.

**691. Research. Credit 1 or more each semester, I, II, S**

For thesis or dissertation. Topic subject to approval of Department Head.

### Department of Petroleum Engineering

Professors Calhoun, Crawford, Kennedy, Ramey, Whiting (Head); Associate Professor Pedigo; Assistant Professors Givens, Little, McGuire

**300. Petroleum Engineering Field Problems. (1-6). Credit 3. S**

Field study of problems encountered in oil and gas fields. Consists primarily of visits to oil and gas fields. Requirements of course will not permit student to take any other course at same time. Prerequisite: Completion of junior petroleum engineering courses.

NOTE: This course may be taken in place of field work as required of all graduates in petroleum engineering. Field work or this course required before registration in any of the senior or fifth year petroleum engineering courses.

**305. Petroleum Development. (2-0). Credit 2. I**

Principles of oil field development, rotary and cable tool drilling methods, drilling fluids, oil field hydrology. Prerequisites: Geol. 201, 207; Math. 307; Phys. 219.

**306. Reservoir Rock Properties. (2-0). Credit 2. II**

Systematic study of physical properties of petroleum reservoir rocks with particular emphasis on porosity, permeability, relative permeability, capillary characteristics, homogeneous and heterogeneous rock systems. Prerequisite: Pet.E. 307.

**307. Petroleum Development Laboratory. (0-3). Credit 1. I**

Properties of petroleum; operation of rotary drilling rig; well surveying practices; tests on drilling fluids and cements. Prerequisite: Pet.E. 305 or registration therein.

**308. Rock and Fluid Properties Laboratory. (0-3). Credit 1. II**

Core analysis, capillary pressure and relative permeability tests, fluid displacement tests; differential and flash vaporization tests of gas saturated crude oil at elevated pressure and temperature. Prerequisite: Pet.E. 306, 310, or registration therein.

**310. Reservoir Fluids. (3-0). Credit 3. II**

Thermodynamic behavior of naturally occurring hydrocarbon mixtures. Evaluation and correlation of physical properties of petroleum reservoir fluids, laboratory and empirical methods. Prerequisites: Chem. 323; Pet.E. 307.

**312. Well Logging. (1-0). Credit 1. II**

Preliminary study of logging methods with particular attention to electric logging and radioactive logging as they would be applied in petroleum industry. Prerequisite: Geol. 210.

**402. Petroleum Property Management. (3-0). Credit 3. II**

Factors which influence value of oil and gas properties; preparation of valuation reports, cost data, operating organization, regulation of petroleum production. Prerequisites: Pet.E. 409, 413, 423.

**405. Drilling and Production Design. (2-2). Credit 3. I**

Study of selection of drilling and production equipment used in oil field practice. Design of drilling and production systems. Prerequisites: C.E. 305; Pet.E. 305, 308, 312.

**409. Subsurface Engineering. (1-3). Credit 2. I**

Well logging, contour maps, isopachous maps, and determination of size, shape, and volume content of petroleum reservoirs. Prerequisites: Pet.E. 305, 308, 312.

**413. Petroleum Measurement and Transportation. (2-2). Credit 3. I**

Theory and methods of gas and liquid measurements and transportation including mixed streams, horizontal and vertical flow, etc. Prerequisites: M.E. 346; Pet.E. 310.

**414. Petroleum Production Engineering. (2-0). Credit 2. II**

Gas lift, surface separation and treatment of oil field fluids. Measurement, sampling and testing of crude oil, tank strapping and preparation of tank tables, oil storage, prevention of loss by evaporation, fire and lightning protection. Prerequisites: Pet.E. 405, 413.

**415. Measurements Laboratory. (0-3). Credit 1. I**

Methods of metering petroleum and natural gas. Study of flow of liquid gas and mixtures of gas and liquid. Advanced study of properties of petroleum at elevated pressure and temperature. Prerequisite: Pet.E. 413 or registration therein.

**416. Oil Measurements and Transportation Laboratory. (0-3). Credit 1. II**

Gauging practices, treating of oil-water emulsion, heat and sulphur content of petroleum and its products, determination of viscosity, gravity, water content, carbon residue, and coefficient of expansion of petroleum. Determination of vapor pressure of natural gasoline. Distillation of crude oil and gasoline. Methods of metering petroleum. Water analysis. Prerequisite: Pet.E. 414 or registration therein.

**419. Drilling Fluids. (0-3). Credit 1. II**

Laboratory course in which field technique and control of mud fluids to facilitate drilling are taught. Prerequisites: Senior classification in petroleum engineering; approval of Department Head.

**428. Reservoir Engineering. (2-0). Credit 2. I**

Material balance methods, including identification of type of reservoir mechanism, future production under primary recovery and gas injection; water influx calculations. Prerequisite: Pet.E. 308

**429. Reservoir Mechanics Laboratory. (0-3). Credit 1. I**

Laboratory course to supplement theory of Pet.E. 428. Advanced core analysis; fundamental tests of PVT properties of petroleum at reservoir conditions. Prerequisites: Pet.E. 305, 308.

**438. Reservoir Engineering. (2-0). Credit 2. II**

Continuation of Pet.E. 428. Displacement of oil by extraneous fluids, evaluation of performance of combination drive reservoirs, sweep efficiency. Prerequisite: Pet.E. 428.

**481. Petroleum Engineering Seminar. (0-2). Credit 1. I**

Study and presentation of papers pertaining to recent developments in field of petroleum engineering. Prerequisites: Pet.E. 305, 308, 312.

**482. Petroleum Engineering Seminar. (0-2). Credit 1. II**

Study and presentation of papers pertaining to recent developments in field of petroleum engineering. Prerequisites: Pet.E. 305, 308, 312.

**485. Problems. Credit 1 to 5. I, II, S**

Special problems in various phases of petroleum engineering assigned to individual students or to groups. Prerequisites: Senior classification; approval of Department Head.

**FOR GRADUATES****601, 602. Drilling and Completing Wells. (3-3). Credit 4 each semester. S**

Advanced study of problems encountered in drilling and completing of oil and gas wells. Prerequisite: Approval of Department Head.

**603, 604. Advanced Reservoir Engineering. (3-3). Credit 4 each semester. I, II**

Advanced course in petroleum production practices with special reference to fundamental principles of flow of reservoir fluids. Prerequisite: Approval of Department Head.

**605. Phase Behavior of Petroleum Reservoir Fluids. Credit 2 to 4 each semester. I**

Study of pressure, volume, temperature, composition relationships of petroleum reservoir fluids. Prerequisite: Approval of Department Head.

**607. Recovery Methods. Credit 2 to 4 each semester. II**

Study of methods of increasing recovery of petroleum from petroleum reservoirs. Prerequisite: Approval of Department Head.

**608. Well Logging Methods. (2-3). Credit 3. II**

Advanced study of well logging methods for determining nature and fluid content of formations penetrated by drill. Prerequisite: Approval of Department Head.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Study and presentation of papers on recent developments in reservoir mechanics. Prerequisite: Approval of Department Head.

**685. Problems. Credit 1 to 4 each semester. I, II**

Offered to enable students to undertake and complete limited investigations not within their thesis research and not covered by any other courses in curriculum. Prerequisite: Graduate classification.

**691. Research. Credit 1 or more each semester. I, II**

Advanced work on some special problem within field of petroleum engineering. Thesis course. Prerequisite: Approval of Department Head.

## Department of Philosophy and Humanities

Assistant Professor Orr

### PHILOSOPHY

**301. Introduction to Philosophy. (3-0). Credit 3. I**

Introduction to philosophical vocabulary and inquiry, based on study of major issues.

**331. Introduction to the Philosophy of Religion. (3-0). Credit 3. I, II**

Philosophical investigation of religious experience, thought, and language.

**381. Ethical Theory. (3-0). Credit 3. II**

Systematic and critical consideration of representative answers to problems concerning values.

**406. Ancient and Medieval Philosophy. (3-0). Credit 3. I**

Study of philosophers and philosophical movements of ancient and medieval periods.

**407. Modern Philosophy. (3-0). Credit 3. II**

Study of philosophers and philosophical movements from Renaissance to twentieth century.

### FOR GRADUATES

**601. Major Philosophical Issues. (2-0). Credit 2. II**

Designed to introduce graduate students to major issues of philosophical thought.

## Department of Physics

Professors Coon, Eisner, Gammel, Ham, Igo, McIntyre, Nuttall, Potter (Head), Squire, Weekes; Associate Professors Barker, Boriskie, Duller, Eisele; Assistant Professors Bell, Kane, Kubis, Loyd, McDonald, Sittler; Instructors Barnes, Boehme, Cantrell, Franks, Hardcastle, Henson, Petty, Reyna, Smith, Stewart, Tapley, Wiff

**201. College Physics. (3-3). Credit 4. I, II, S**

Fundamentals of classical mechanics, heat, and sound primarily for architecture, education, premedical, predental, and pre-veterinary medical students. Prerequisite: Math. 103.



**202. College Physics. (3-3). Credit 4. I, II, S**

Continuation of Phys. 201. Fundamentals of classical electricity and light and introduction to contemporary physics. Prerequisite: Phys. 201.

**211. A Brief Survey of Physics. (3-3). Credit 4. II**

Designed to acquaint students with field of knowledge and contemporary activity of importance in modern thinking. Prerequisite: Math. 102.

**213. Physics for Students of Agriculture. (2-2). Credit 3. I, II**

Brief course emphasizing fundamentals of mechanics, heat, light, and electricity of special importance to students of agriculture. Prerequisite: Math. 102.

**218. Mechanics and Heat. (3-3). Credit 4. I, II, S**

Mechanics and heat for students of engineering and physical sciences. Prerequisite: Math. 121 or 209 or registration therein.

**219. Sound, Light, Electricity. (3-3). Credit 4. I, II, S**

Continuation of Phys. 218. Sound, light, electricity. Prerequisites: Math. 122 or 210 or registration therein; Phys. 218.

**220. Modern Physics. (3-3). Credit 4. I, II, S**

Continuation of Phys. 219. Atomic, nuclear, and solid-state physics. Prerequisites: Math. 122 or 210; Phys. 219.

**302. Physical Mechanics. (3-0). Credit 3. I**

Motion of particle in various force fields; systems of particles. Prerequisites: Math. 308 and registration in 405; Phys. 220.

**310. Applications of Modern Physics. (2-2). Credit 3. II, S**

Non-technical survey of atomic and nuclear phenomena of interest to students of geology, biochemistry, genetics, biology, education, and especially premedical and pre-dental students. Prerequisites: Chem. 101 or 103; Phys. 202 or 219.

**311. Quantum Physics. (3-0). Credit 3. I**

Atomic and nuclear phenomena that led to establishment of modern physics; introduction to special relativity and quantum relationships. Prerequisites: Math. 308; Phys. 220.

**314. Survey of Astronomy. (3-0). Credit 3. I, II, S**

Solar system; meteors; asteroids; comets; stars; clusters; nebulae; Kepler's laws; laws of gravitation; astronomical instruments. Occasional evening meetings for observation. Prerequisites: Math. 102, 103.

**317. Celestial Mechanics. (4-0). Credit 4. I**

Mathematical formulation of celestial mechanics, central forces, potentials and attractions of bodies; the two-, three-, and n-body problems. Prerequisites: Math. 307; Phys. 201 or 218.

**322. Intermediate College Physics. (4-6). Credit 6. I, S**

Review of physics for high school and junior high science teachers and elementary science supervisors to better prepare them for upper division courses. Prerequisite: Six hours of physics.

**323. Topics in Electricity and Electronics. (2-3). Credit 3. S**

Topics that high school and junior high science teachers and elementary science supervisors will be able to pursue in instruction in their schools. Prerequisites: Math. 122 or 210; Phys. 202, 219, or 322.

**325. Physics Laboratory. (0-3). Credit 1. I**

Experimental studies primarily in physical optics. Prerequisite: Registration in Phys. 311.

**326. Physics Laboratory. (0-3). Credit 1. II, S**

Experimental studies primarily in electricity, magnetism, and electronics. Prerequisite: Registration in Phys. 413.

**327. History and Philosophy of Physical Science. (3-0). Credit 3. I**

From Babylon to Atomic Age; development of scientific philosophy into modern pragmatic view; designed to give student feeling for scientific method and environment of scientist. Prerequisite: Phys. 220.

**405. Physical Mechanics. (3-0). Credit 3. II**

Continuation of Phys. 302. Rigid bodies; moving coordinate systems; continuous media; generalized coordinates. Prerequisite: Math. 405; Phys. 302 or equivalent.

**408. Thermodynamics and Statistical Mechanics. (3-0). Credit 3. II**

Applications to mechanical and chemical systems and to theory of blackbody radiation; kinetic theory of gases. Prerequisites: Math. 307; Phys. 220.

**412. Introduction to Quantum Mechanics. (3-0). Credit 3. I**

Postulates of wave mechanics; wave packets; harmonic oscillator; central field problem; selection rules; electron spin; exclusion principle. Prerequisite: Phys. 311.

**413. Electricity and Magnetism. (3-0). Credit 3. II, S**

DC and AC circuit theory; introduction to electronic circuits. Prerequisites: Math. 308; Phys. 219.

**414. Electricity and Magnetism. (2-3). Credit 3. I**

Non-linear circuits; functions of tube and transistors; electronic circuits and circuit elements for physical measurements. Prerequisite: Phys. 413 or approval of instructor.

**416. Electromagnetic Fields. (3-0). Credit 3. I**

Vector analysis applied to electromagnetic field theory; dielectrics and magnetic materials; Maxwell's equations; radiation. Prerequisites: Math. 405 or 601; Phys. 413 or approval of instructor.

**417. Radiation and Optics. (3-0). Credit 3. II**

Lorentz theory of radiation; dipole radiation; radiation from a Lorentz atom; Kirchhoff integral applied to diffraction; reflection; refraction; scattering. Prerequisite: Phys. 416.

**420. Introduction to Astrophysics. (4-0). Credit 4. II**

Sun's core; internal structure of stars; stellar and planetary atmospheres; radiation; interstellar matter. Prerequisites: Math. 307 or registration therein; Phys. 220, 314, and a course in heat.

**421. Celestial Mechanics. (4-0). Credit 4. II**

Continuation of Phys. 317. Binary star systems; orbits; perturbations of the moon; general perturbations; problem of satellites. Prerequisite: Phys. 317.

**424. Physics of Solids. (3-0). Credit 3. II**

Modern theories of crystalline structure, specific heats, dielectric properties, conduction, semiconduction, electron emission, magnetism. Prerequisite: Phys. 311.

**425. Physics Laboratory. (0-3). Credit 1. I**

Experiments in nuclear, atomic, and molecular physics using modern instrumentation and equipment of current research. Prerequisite: Senior classification in physical sciences or engineering.

**426. Physics Laboratory. (0-3). Credit 1. II**

Experiments in solid state and nuclear physics. Modern instrumentation and current research equipment are employed. Prerequisite: Senior classification in physical sciences or engineering.

**427. Electrical and Electronic Circuits. (2-3). Credit 3. S**

DC and AC circuit theory; electrical measurements; introduction to electronics. Prerequisites: Math. 308; Phys. 219.

**428. Nuclear Physics. (3-0). Credit 3. II**

Passage of radiations through matter; detection methods; accelerators; systematics of nuclei. Prerequisite: Phys. 311.

**430. Introduction to Biophysics. (3-0). Credit 3. I**

Application of physics to study of living systems; nervous and sensory systems; enzyme kinetics; biological thermodynamics; active transport processes; modern instrumentation. Prerequisite: Phys. 202 or 219.

**435. Classical and Quantum Wave Mechanics. (3-0). Credit 3. II**

Pressure waves; electromagnetic wave propagation in transmission lines; wave propagation in periodic structures; electron transport in metals. Prerequisite: Math. 308.

**485. Problems. Credit 1 to 4. I, II, S**

Special work in laboratory or theory to meet individual requirements in cases not covered by regular curriculum. Prerequisite: Approval of Department Head.

**FOR GRADUATES****600. Physics for Secondary School Teachers. (2-3). Credit 3. S**

Fundamentals of classical and modern physics that should be taught in high school; methods of preparing and conducting demonstrations and laboratories. Prerequisite: Graduate classification and approval of Department Head.

**601. Analytical Mechanics. (4-0). Credit 4. I, S**

Dynamics of particles and rigid bodies; hydrodynamics; Hamilton's principle; principle of least action; LaGrange's and Hamilton-Jacobi equations. Prerequisites: Math. 405 or 601; Phys. 405.

**603. Electromagnetic Theory. (4-0). Credit 4. II**

Static and time-varying fields; propagation, reflection and refraction of electromagnetic waves. Prerequisites: Math. 601; Phys. 416; or equivalents.

**606. Quantum Mechanics. (4-0). Credit 4. I, S**

Postulational development. Hamiltonian formalism; canonical transformations; representation and expansion theory; perturbation theory. Prerequisite: Phys. 412.

**607. Statistical Mechanics. (4-0). Credit 4. II**

Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac distributions; ensemble theory; statistical thermodynamics; electrons in metals; lattice specific heats. Prerequisite: Phys. 408 or approval of instructor.

**611. Electromagnetic Theory. (4-0). Credit 4. I, S**

Continuation of Phys. 603. Boundary value problems of vector wave equation; effect of matter on waves; anisotropic dielectrics; dispersive media. Prerequisite: Phys. 603.

**612. Introductory Quantum Mechanics. (3-0). Credit 3. S**

Schrodinger wave equation; uncertainty principle; one-dimensional problems; hydrogen atom; angular momentum; transition probabilities. Prerequisite: Phys. 311.

**617. Physics of the Solid State. (3-0). Credit 3. I, S**

Crystalline structure, lattice vibration; dielectric phenomena; luminescence; magnetism; free electron and band theories; semi-conductors. Prerequisite: Phys. 412, 607.

**624. Quantum Mechanics. (4-0). Credit 4. II**

Continuation of Phys. 606. Scattering theory; angular momentum theory; matrix mechanics; application to atomic and nuclear systems; semi-classical radiation theory. Prerequisite: Phys. 606.

**625. Nuclear Physics. (3-0). Credit 3. I, S**

The two-nucleon problem; electromagnetic interactions; beta decay; nuclear reactions; subnuclear particle reactions. Prerequisites: Phys. 428, 606 or equivalent.

**631. Quantum Theory of Solids. (3-0). Credit 3. II**

Perfect and imperfect crystal lattices; interaction of electromagnetic radiation with non-conducting crystals; metallic cohesion; transport phenomena; semiconductors, superconductors, superfluids. Prerequisite: Phys. 617.

**632. Molecular Structure. (4-0). Credit 4. II**

Principle of group theory; molecular orbitals; molecular vibrations; the rigid rotator; ultraviolet spectra; infrared and Raman spectra. Prerequisite: Approval of instructor.

**634. Relativistic Quantum Field Theory. (3-0). Credit 3. I**

Perturbation theory and renormalization techniques; dispersion relations, Mandelstam representation. Prerequisite: Phys. 606.

**635. Scattering Theory. (3-0). Credit 3. I**

Scattering of particles by non-central fields; polarized particles; scattering of



pions and nucleons by nucleons; the optical model; the deuteron stripping reaction. Prerequisite: Phys. 606.

**636. The Many-Body Problem. (3-0). Credit 3. II**

Nuclear matter, liquid  $\text{He}^3$ , the Bose gas, the electron gas, super-conductivity. Prerequisite: Phys. 606.

**637. Relativity. (3-0). Credit 3. S**

Special relativity, co-variant formulation of mechanics and electrodynamics; general relativity, tensor calculus and non-Euclidean geometry; cosmological problems and unified field theories. Prerequisites: Phys. 601, 603.

**638. Physics of Plasmas. (3-0). Credit 3. II**

Many-body kinetic theory of plasmas; plasma fluctuations; propagation of electromagnetic waves through plasmas; magnetohydrodynamics; plasma stability and confinement. Prerequisites: Phys. 603, 607, 624.

**639. Magnetic Resonance. (3-0). Credit 3. I**

High resolution spectra; relaxation phenomena; electron resonance; electron-nucleus interaction; resonance in solids and liquids; effects of strong radio-frequency fields. Prerequisites: Phys. 603, 607, 624.

**644. Low Temperature Physics. (3-0). Credit 3. I**

Quantum behavior of matter at extremely low temperatures; superfluid liquid helium; superconductivity; thermal properties of solids; electric and magnetic phenomena. Prerequisites: Phys. 606, 607.

**645. Nuclear Theory. (3-0). Credit 3. I**

Topics of current interest, e.g., multipole theory of electromagnetic interaction, shell model, and collective model of nucleus. Prerequisites: Phys. 606, 625.

**648. Cosmic Rays. (3-0). Credit 3. II**

Phenomenology and theory of contemporary cosmic ray physics with emphasis on subjects of current research interest. Prerequisite: Phys. 603, 606; approval of instructor.

**681. Seminar. (1-0). Credit 1. I, II, S**

Examination of subjects of current importance. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Individual problems not related to thesis.

**691. Research. Credit 1 or more each semester. I, II, S**

Research toward thesis or dissertation.

## Department of Plant Sciences

Professors Hall, Joham, Langston, Rosberg (Head), Watkins; Associate Professors Applegate, Bird, McNeil, Powell, Shaver, Smith, Thames; Assistant Professors Amin, Ashworth, Frederiksen, Halliwell, Katterman, Miller, Morgan; Lecturer HacsKaylo; Plant Pathologists Kilpatrick, Schroeder; Plant Physiologists Meyer, Morton; Silviculturist van Buijtenen

### GENETICS SECTION

**301. Genetics. (3-2). Credit 4. I, II, S**

Fundamental principles of genetics: variation, heredity, physical basis of Mendelian inheritance, expression and interaction of genes, linkage, sex linkage, and mutation. Prerequisite: Biol. 101 or 107.

(See Agro. 304, An.Sc. 306, P.S. 414, and Stat. 406 for descriptions of related courses.)

### FOR GRADUATES

**603. Genetics. (3-0). Credit 3. I**

Development of fundamental concepts including dominance, chromosome theory of heredity and linkage, sexuality, mutation and position effect, gene concept and extra nuclear inheritance. Prerequisite: Gen. 301.

**604. Genetics Laboratory. (0-3). Credit 1. I**

Inheritance studies principally with *Drosophila* including laboratory techniques and methods. Arranged to complement Gen. 603 and required for genetics majors.

**612. Plant Genetics. (3-3). Credit 4. II**

Specialized study of genetics as related to plant breeding. Emphasis placed on quantitative inheritance, heterosis, selection, ploidy, reproductive systems and processing of quantitative data. Prerequisites: Gen. 603; Stat. 406.

**620. Cytogenetics. (3-3). Credit 4. II**

Study of correlated genetical and cytological phenomena. Prerequisites: Biol. 615; Gen. 603.

**623. Special Topics in Genetics. Credit 1 to 3. I**

Content will depend upon interest of students and speciality of instructor. Lecturers who have attained distinction in genetics or related fields will conduct course.

**624. Statistical Genetics. (2-0). Credit 2. I**

Probability as applied to genetic systems; derivation of genetic expectations; theory of inbreeding; estimation and testing of genetics parameters; statistical aspects of quantitative inheritance. Prerequisites: Gen. 603; Stat. 406.

**625. Speciation. (2-0). Credit 2. I**

Study of genetic and environmental forces which operate in species formation together with critical examination and comparison of more important current explanations of speciation. Prerequisites: Biol. 349; Gen. 301. (Offered in 1964-65 and in alternate years thereafter.)

**631. Biochemical Genetics. (2-0). Credit 2. I**

Study of genetic control of cellular metabolism; mechanism of gene action; genetic capacity for biosynthesis; gene-enzyme relationships; pleiotropism; chemical nature of agents of heredity. Prerequisites: B.N. 410 or Chem. 227; Gen. 301.

**633. Forest Genetics. (2-0). Credit 2. I**

Specialized study of genetics as applied to forest trees; forest tree improvement and forest tree breeding, with emphasis on genetics of conifers, especially pines. Prerequisite: Gen. 603. (Offered in 1965-66 and in alternate years thereafter.)

**634. Forest Genetics Laboratory. (0-3). Credit 1. II**

Methods and techniques in forest genetics, forest tree breeding; crossing, grafting, air layering, field layouts, seed handling, greenhouse techniques. Prerequisite: Gen. 633. (Offered in 1964-65 and in alternate years thereafter.)

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Technical research problems subject to approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Prerequisite: Gen. 603.

(See An.Sc. 616, 628; P.S. 613; Stat. 605 for descriptions of related courses.)

## PLANT PHYSIOLOGY AND PATHOLOGY SECTION

**301. Plant Pathology. (2-3). Credit 3. I**

Introduction to fundamental principles of plant pathology, including diagnosis, cause, and control of plant diseases. Prerequisites: Biol. 101, 206.

**313. Introduction to Plant Physiology. (2-3). Credit 3. I**

General course dealing with principal life processes of higher plants, with particular emphasis on influence of environmental factors on these processes. Prerequisites: Biol. 101; Chem. 102 or 104.

**314. Principles of Plant Physiology. (3-3). Credit 4. II**

More advanced and detailed study of physiology of green plants than P.P.P. 313, with emphasis on nitrogen metabolism, respiration, mineral nutrition, photosynthesis, and growth. Prerequisites: Chem. 231; Phys. 213; P.P.P. 313.

## FOR GRADUATES

**605. Plant Metabolism. (3-0). Credit 3. I**

Metabolic pathways of major classes of plant compounds, respiration and photosynthesis as metabolic processes and bioenergetics. Prerequisite: P.P.P. 314. (Offered in 1965-66 and in alternate years thereafter.)

**607. Physiology of the Fungi. (3-0). Credit 3. II**

General course in physiological activities of fungi, including growth and development, mineral nutrition, carbon and vitamin nutrition, chemistry of metabolic products, fungicides, and physiology of parasitism and resistance. Prerequisite: P.P.P. 314. (Offered in 1965-66 and in alternate years thereafter.)

**609. Quantitative Plant Physiology. (2-6). Credit 4. II**

Methods employed in various types of physiological investigations and interpretation of results obtained by them. Prerequisite: P.P.P. 314.

**611. Plant Nutrition. (3-0). Credit 3. II**

Inorganic nutrition of plants, including solute absorption, accumulation and translocation; growth in artificial media; physiological roles of various elements and biochemical problems associated with salt absorption. Prerequisite: P.P.P. 314 or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**612. Phytohormones and Plant Growth Regulators. (3-0). Credit 3. I**

Classification, properties, and action of naturally occurring plant hormones as well as synthetic growth regulators and their practical application. Prerequisite: P.P.P. 314 or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**613. Plant Growth and Development. (3-0). Credit 3. I**

Course dealing with growth, differentiation, and development of higher plants. Comprehensive study of vernalization and photoperiodism as well as discussion of hormones and biological rhythms. Prerequisite: P.P.P. 314 or equivalent.

**616. Methods in Plant Pathology. (2-6). Credit 4. II**

Familiarization with standard techniques and equipment used in investigation of plant disease and various plant pathogens. Prerequisite: P.P.P. 301 or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**617. Parasitism in Plant Disease. (3-3). Credit 4. I**

Critical review of literature on parasitism and mechanisms of host defense. Processes studied by histological preparations and experimentation. Prerequisite: P.P.P. 301. (Offered in 1965-66 and in alternate years thereafter.)

**618. Bacterial Plant Diseases. (2-3). Credit 3. II**

Detailed study of bacterial diseases of fruit and vegetable crops, field crops and ornamental plants, with special emphasis upon nature of the disease, dissemination of the pathogen, and methods of control. Prerequisite: P.P.P. 301 or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**620. Plant Viruses. (2-0). Credit 2. II**

Study of nature and properties of plant viruses and plant virus diseases. Prerequisite: P.P.P. 301 or equivalent. (Offered in 1965-66 and in alternate years thereafter.)

**621. Plant Parasitic Nematodes. (2-3). Credit 3. I**

Morphology, identification, and biology of plant parasitic and soil-borne nematodes; damage they cause; methods of control. Prerequisite: Approval of instructor.

**622. Plant Nematology. (1-6). Credit 3. II**

Advanced study of principal groups of plant parasitic and soil-borne nematodes with emphasis on biology. Prerequisite: P.P.P. 621 or equivalent. (Offered in 1966-67 and in alternate years thereafter.)

**623. Diseases of Field Crops. (2-3). Credit 3. I**

Intensive study of both fundamental and practical aspects of more important and representative diseases of field crops. Plant disease problem peculiar to extensive cultivation methods will be stressed. Prerequisite: P.P.P. 301.

**624. Diseases of Fruits, Vegetables, and Ornamentals. (2-3). Credit 3. II**

Identification and control of important diseases of fruit, vegetable, and ornamental



crops in Texas. Various diseases and types of decay affecting products in shipment and storage. Prerequisite: P.P.P. 301. (Offered in 1965-66 and in alternate years thereafter.)

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Reports and discussions of topics of current interest in plant physiology and plant pathology, including reviews of literature on selected subjects.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Individual problems or research not pertaining to thesis or dissertation. Prerequisite: P.P.P. 314 or equivalent (for physiology), 301 or equivalent (for pathology).

**691. Research. Credit 1 or more each semester. I, II, S**

Original investigations in support of thesis or dissertation.

### Department of Poultry Science

Professors Couch, Krueger, Quisenberry (Head); Associate Professors Fanguy, Ferguson, Gardner, Ryan; Assistant Professors Atkinson, Bradley, Creger

**201. Poultry Production. (2-2). Credit 3. I, II**

Basic course in poultry science that involves principles and practices in production and marketing of poultry and poultry products in a highly specialized industry. Practice consists of application of basic skills required for efficient performance.

**303. Turkey Production. (2-0). Credit 2. II**

Varieties of turkeys; breeding practices; management and feeding; incubation practices; management of poults from hatching to market; special turkey marketing practices; sanitation and disease prevention with special reference to turkeys.

**308. Hatchery Management. (2-3). Credit 3. II**

Study of incubation, business and management fundamentals associated with independent, franchise and integrated hatchery operations. Management techniques and problem solving are stressed. Research is presented to support principals proposed for sound hatchery management.

**309. Broiler Production. (2-2). Credit 3. I**

Comprehensive study of commercial broiler industry involving advanced elements of production, processing, and marketing. Practice consists of designing and conducting experiments and demonstrations for evaluation of meat strains, rations, and environmental factors.

**401. Management and Selection. (1-2). Credit 2. II**

Study in recognizing field problems in poultry science and how those working with vocational training programs can economically solve such problems. Practice consists of training skills such as judging, fitting show birds and management of a show, demonstrations, and science projects using poultry.

**403. Judging. (2-2). Credit 3. I**

Study of selection standards for meat and egg strains of poultry, grading standards for live and dressed poultry and market eggs, and organizing and managing a poultry show. Practice consists of intensive judging of production rings and poultry market products.

**407. Technology and Marketing of Poultry and Poultry Products. (2-2). Credit 3. I**

Study of U.S.D.A. grading of eggs and poultry; preparation of poultry for market; grading and packing shell eggs; factors affecting product quality; storage of poultry and egg products with emphasis on maintenance of quality; developments in packaging and merchandizing; U.S.D.A. grading and inspection.

**411. Poultry Feeding. (3-2). Credit 4. I**

Study of chemical composition of carbohydrates, proteins, fats, vitamins, and mineral mixtures as found in poultry feeds and nutritive value of different grains, roughages, mill feeds, and protein concentrates. Prerequisites: Chem. 223, 231.

**414. Poultry Breeding. (2-2). Credit 3. I**

Basic principles of poultry breeding. Inheritance of qualitative and quantitative traits; evaluation of methods of breed selection, mating systems and of basic statistical analysis of breeder records. Prerequisite: Gen. 301.

**481. Poultry Seminar. (1-0). Credit 1. II**

Extensive review of the literature. Effective and efficient use of library. Procedures for organized informational follow-up on new developments after graduation. Scientific and popular journal organization and contents. Reports on current literature. Prerequisite: Senior classification.

**485. Problems. Credit 1 to 4 each semester. I, II, S**

Directed study of selected problems not covered by other courses in the Department. Content of course would be adapted to interest and needs of students. Prerequisite: Approval of Department Head.

**FOR GRADUATES****603. Principles and Practices of Incubation. (3-3). Credit 4. II**

Study of basic principles underlying successful artificial incubation of eggs. Relation of egg characters to hatchability. Developmental stages of chick during incubation. Prerequisite: P.S. 308 or equivalent.

**604. Principles of Brooding and Rearing. (3-3). Credit 4. I**

Intensive literature review and analysis of environmental and physiological factors influencing growth and development of domestic birds. Density, seasonal rhythms, social behavior, plane of nutrition, etc. are considered. Prerequisites: P.S. 201, 303 or equivalent.

**609. Avian Physiology. (3-3). Credit 4. I**

Study of basic physiological principles pertaining specifically to avian species. Chicken used as laboratory animal. Vascular, digestive, neural, respiratory, and reproductive systems will be stressed. Prerequisites: Biol. 433; approval of instructor.

**611. Poultry Processing, Storing, and Distribution. (3-0). Credit 3. II**

Studies of poultry and egg quality and of methods of maintaining product quality. Effects of storage condition and time on egg and meat quality. Production factors affecting product quality. Evaluation of commercial methods of product assembly, processing and distribution.

**612. Laboratory Problems in Poultry Processing, Storing, and Distribution. (0-3). Credit 1. II**

Survey of methods of processing poultry and eggs. Selected processing plants visited and study made of operating methods. Poultry and egg products analyzed using standard quality control methods. Effects of processing methods on market quality.

**613. Breeding and Genetics of Poultry. (3-3). Credit 4. II**

Advanced poultry breeding; emphasis on estimation of genetic parameters, measuring genetic improvement, effective population size, general and specific combining ability, fitness, diallel crossing, efficiency of breeding systems in poultry. Prerequisite: Approval of instructor.

**615. Avian Nutrition. (3-0). Credit 3. I**

To cover metabolism and nutritional requirements of domestic fowl to include proteins, carbohydrates, fats, minerals, vitamins and related feed additives. Prerequisites: Chem. 228; P.S. 411.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Intensive review of literature on feeding, breeding, incubation, marketing and management. Development of familiarity with journals, organizations, agencies and personnel working on poultry problems. May be repeated as many semesters as desired. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 6 each semester. I, II, S**

Intensive study of newer principles and methods in various specialized fields of poultry science — breeding, nutrition, market technology. Prerequisite: Approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Research methods and techniques in breeding, nutrition, physiology, marketing, management and products technology. Students must conduct experiments in one of these fields. Design of experiments, collection, analysis and presentation of experimental data. Designed for thesis or dissertation credit.

## Department of Range Science

Professors Dyksterhuis, Gould, Leinweber (Head), Sperry; Associate Professors McCully, Rhodes; Assistant Professors Dodd, Huss; Lectures Merrill, Waldrip

### FORESTRY SECTION

#### 203. Dendrology. (1-3). Credit 2. I

Identification, classification, group silvical characteristics, distribution, and values of important trees and shrubs of coniferous groups (Gymnosperms). Field trips arranged. Prerequisite: Biol. 102.

#### 204. Dendrology. (2-3). Credit 3. II

Identification, classification, group silvical characteristics, distribution, and values of important trees of hardwood group (Angiosperms); as well as shrubs and other woody plants associated with woodlands and commercial forests. Field trips arranged. Prerequisite: Biol. 102.

#### 309. Silvics and Silviculture. (2-3). Credit 3. I

Study of factors of site, their influence on tree growth and reciprocal effect on site; silvicultural cutting systems, cultural operations, and silvicultural characteristics of more important commercial species of South and Southwest. Field trips.

### RANGE SCIENCE SECTION

#### 102. Introduction to Range and Forestry. (1-0). Credit 1. II

Brief survey of fields of forestry and range management including history, resources, policies, organization, industries, employment, education and research pertaining to respective professions. One field trip into forest required.

#### 205. Plant Ecology. (2-2). Credit 3. I, II

Introduction to plant ecology studying scope and organization of plants into systematic units influenced by environmental factors and mechanisms which allow plants to adapt to changes in environment. Prerequisite: Biol. 101.

#### 303. Agrostology. (2-2). Credit 3. I

Fundamental study of grasses, especially those of economic importance in Texas. Structure of grasses, subfamily-tribe relationships, grass classification, important genera and species. Prerequisite: Biol. 102 or equivalent.

#### 314. Principles of Range Management. (2-2). Credit 3. I, II

Technical course in range management for students interested in basic knowledge of range management. Principles of forage plant properties, poisonous plants, ecology and management of rangelands for sustained production. Field trips. Prerequisite: Junior or senior classification.

#### 315. Vegetation Evaluation Methods. (2-2). Credit 3. II

Methods and techniques of vegetation analysis related to forest, range, and pasture lands; sampling procedures and instrumentation used for determining vegetation inventories, conditions, uses, and trend. Prerequisites: Biol. 101; approval of instructor.

#### 316. Grassland Ecology. (2-2). Credit 3. II

Principles of plant succession and ecological formations of North America emphasized. Treatment of grassland ecology from ecosystem approach. Prerequisites: Biol. 102; R.S. 205.

#### 415. Advanced Range Management. (3-2). Credit 4. II

Advanced course dealing with basic concepts and theories of range management systems as related to physiological, edaphic and ecological principles. Special attention devoted to plant-animal-environmental interactions. More emphasis given to management planning. Prerequisites: R.S. 314, 315, or approval of Department Head.

#### 417. Synecology. (2-2). Credit 3. I

Emphasis given to dynamic aspects of plant community development with particular study on concepts of ecological plant climax and identification of ecological position through observing specific indicator plants. Prerequisite: R.S. 316.

#### 418. Weed and Brush Control. (2-2). Credit 3. I

Study of fundamentals of weed and brush control together with application to



production of forage crops, livestock, and other agricultural commodities. Emphasis given to characteristics, selection, and application of alternative methods of controlling weeds and brush in management and conservation of agricultural lands. Prerequisite: Chem. 227 or approval of instructor.

**419. Advanced Plant Ecology. (2-4). Credit 3. I**

Single environmental factors which determine ecological potentials such as soil, temperature, rainfall, relative humidity, evaporation, photoperiod, and others. Laboratories devoted to measurement and interpretation of single factor affects. Prerequisite: R.S. 205.

**481. Seminar. (1-0). Credit 1. I, II**

Selected topics discussed by senior students in fall semester. Staff members and invited speakers will discuss professional attitudes and opportunities in range management. Prerequisites: Senior classification; major in range science.

**485. Range Problems. Credit 1 to 3 each semester. I, II, S**

Individual study and research upon a selected range problem approved by instructor.

### FOR GRADUATES

**605. Range Research Methods. Credit 2. I**

Study of research methods in range management and related subjects. Review of scientific investigation in field and analysis of results. Prerequisite: Graduate majors in range science.

**606. Range Economics. (2-0). Credit 2. II**

Range management practices, land utilization, and ranch operation as they affect economics of livestock industry and nation. Prerequisite: Graduate majors and minors in range science.

**607. Vegetation Influences. (3-0). Credit 3. I**

Interrelationships between ecological factors and vegetation, influence of forest and range vegetation on watershed management and soil conservation. Prerequisite: R.S. 316.

**609. Plant and Range Ecology. (3-0). Credit 3. I**

Detailed study of plant communities, successions, and effect of various degrees of utilization in vegetation types and edaphic factors. Prerequisite: R.S. 316 or equivalent.

**610. Range Grasses and Grasslands. (2-3). Credit 3. II**

Study of basic concepts of grass structure and classification, recent advances in agrostological research, genetical and ecological basis for patterns of variation and evolution in grasses. Prerequisite: R.S. 303, 316; approval of Department Head.

**611. Control of Noxious Range Plants. (3-0). Credit 3. II**

Advanced study of noxious and poisonous plants detrimental to good management of ranges in Texas and Southwest. Distribution, reproduction, dissemination, economic importance, and alternative methods for controlling these undesirable plants stressed. Field trips.

**612. Range Management Practices, Policies, and Administration. (3-0). Credit 3. I**

Advanced studies dealing with development of policy through political process, national to local philosophical values and social goals, administrative decision making, and technical objectives. Emphasis on current policy problems related to land resource use. Prerequisite: R.S. 415 or equivalent.

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Current scientific work in range management and related subjects in American and foreign fields. Prerequisite: Majors and minors in range science.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Course designed for investigations not included in student's research for thesis or dissertation. Problems selected in applied ecology, range management or forestry. Lectures, conferences, field work, reports. Prerequisite: Graduate majors or minors in range science.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis or dissertation. Prerequisite: Graduate major in range science.

### **Department of Soil and Crop Sciences**

Professors Blackhurst, Bloodworth (Head), Brown, DeWerth, Hampton, Holt, Kunze, McAfee, Perry, Potts, Runkles, Thomas; Associate Professors Burns, Gerard, Godfrey, Niles, Staten, Storey, Whiteley; Assistant Professors Anderson, Fuqua, Janne, McBee, Mills, White; Instructor Clark

**101. Introduction to Soil and Crop Sciences. (1-0). Credit 1. I**

Brief summary of sciences of horticulture, floriculture agronomic crops, and soils and water. Management, production, and processing of various crops considered along with education, employment, and research pertaining to respective professions.

#### **AGRONOMY SECTION**

**105. Fundamentals of Crop Production. (2-2). Credit 3. I, II**

Origin, early history, classification, and distribution of agronomic crops; influence of climate and soils on growth; germination, growth and development, and reproduction of crops; recommended cultural practices and importance of agronomic crops.

**301. Soil Science. (3-2). Credit 4. I, II, S**

Basic course in soil science which deals with principles of soil chemistry, physics, microbiology, fertility, and pedology. Prerequisites: Chem. 102 or 104; junior classification.

**304. Plant Breeding. (3-2). Credit 4. II**

Improvement of crops by hybridization and selection. Special breeding methods and techniques applicable to naturally self-pollinated, cross-pollinated, and asexually reproduced plants. Prerequisite: Gen. 301. (Offered in 1965-66 and in alternate years thereafter.)

**305. Seed Technology and Commercial Grading. (2-3). Credit 3. II**

Study of important crop seeds with emphasis on harvesting, cleaning, and storage as they influence quality of planting seed. Grading of grain, cotton, and hay according to Federal standards. Prerequisites: Agro. 105; Biol. 101.

**306. Grain and Fiber Crops. (3-2). Credit 4. I**

Study of geographical distribution, classification, physiology, principles of production, and use of grain and fiber crops. Prerequisites: Agro. 105, 301; Biol. 101.

**308. Forage Crops. (2-2). Credit 3. I, II**

Production, utilization, and identification of major forage crop plants with emphasis on adapted species and varieties for Southwest. Prerequisites: Agro. 105, 301; Biol. 101

**310. Soil Morphology. (1-3). Credit 2. II**

Field study of morphological features of soil profile in relation to soil utilization and management. Soil development, classification, and mapping. Prerequisite: Agro. 301.

**318. Soil Conservation. (3-3). Credit 4. I, II, S**

Study of physical and chemical deterioration of soils and basic land use treatment principles. Conservation farm plan developed emphasizing proper management of soils and crops.

**417. Pasture Management. (3-0). Credit 3. II**

Adaptation and management of native and introduced pasture plants; their establishment, production, utilization, and maintenance in permanent and temporary pastures. Field trips required. Prerequisite: Agro. 301.

**422. Soil Conditions and Plant Growth. (3-4). Credit 4. II**

Chemical, biological, and physical processes, activities, and conditions in soils as they influence plant growth. Prerequisites: Agro. 301; approval of instructor.

**426. Fertilizer Technology. (2-0). Credit 2. II**

Study of problems of manufacture, storage, and application of commercial fertilizers, including limited number of required field trips to various types of fertilizer plants. Prerequisite: Agro. 301.

**428. Turf Management. (2-2). Credit 3. II**

Study of fundamental and special problems in establishment, utilization, and management of turf grasses under varying use conditions. Field trips required. Prerequisites: Agro. 301; P.P.P. 301, 313.

**445. Soil Physics. (2-3). Credit 3. I**

Study of fundamentals of soil physics and their application to solution of problems in crop production, irrigation, and engineering. Prerequisites: Nine hours of soils and physics, with minimum of three hours of each (may include soil mechanics.)

**481. Agronomy Seminar. (1-0). Credit 1. I, II**

Preparation and presentation by students of papers on pertinent agronomic topics. Required of all agronomy majors in their last semester. Prerequisite: Senior classification in agronomy.

**485. Problems. Credit 1 to 4. I, II, S**

For advanced undergraduates to permit field or laboratory investigation or study of subject matter not included in established courses. Prerequisites: Ten hours of junior and senior agronomy.

**FOR GRADUATES****601. Grain and Cereal Crops. (3-0). Credit 3. S**

Advanced study of grain and cereal ecology, utilization, physiology, and morphology, including critical review of world literature reporting recent investigations in this field.

**602. Forage Crops. (3-0). Credit 3. I**

Advanced study of forage production, utilization, ecology, physiology, and morphology. Factors affecting initiation of regrowth and seed and forage quality. Review of world literature reporting recent investigations in this field.

**605. Pedology. (3-0). Credit 3. I**

Advanced study of development, morphology, constitution, and classification of soils.

**617. Advanced Soil Physics. (3-3). Credit 4. II**

Physical constitution and properties of soil, including consistence and structure, aeration, soil water, and thermal relationships. Prerequisites: Agro. 445 or equivalent and a two-semester course in physics. (Offered in 1964-65 and in alternate years thereafter.)

**618. Advanced Soil Analysis. (2-3). Credit 3. II**

Designed to familiarize student with more difficult problems of soil analysis and interpretation of data. Prerequisite: Agro. 422. (Offered in 1965-66 and in alternate years thereafter.)

**624. Physical Chemistry of Soils. (3-3). Credit 4. I**

Physical chemistry of clay minerals and inorganic and organic soil colloids. Prerequisites: Agro. 617, 618, 626; Chemistry 324. (Offered in 1964-65 and in alternate years thereafter.)

**626. Soil Mineralogy. (3-3). Credit 4. I**

Study of crystal structures and properties of more important agricultural and industrial clays combined with identification techniques involving X-rays, differential thermal analysis, and electron microscopy. (Offered in 1965-66 and in alternate years thereafter.)

**627. Soil Fertility Relationships. (2-0). Credit 2. II**

Advanced study of behavior of nutrient elements in soils and plants. Emphasis placed on nitrogen, phosphorus, and potassium. Prerequisites: Agro. 422; P.P.P. 314. (Offered in 1964-65 and in alternate years thereafter.)

**681. Seminar. (1-0). Credit 1 each semester. I, II**

For graduate students and staff members in soils and crops. Presentation and discussion of special topics and research data in field of agronomy. Participation required of all graduate students in agronomy.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Advanced problems in some phase of agronomy not directly related to thesis or dissertation.



**691. Research. Credit 1 or more each semester. I, II, S**

Investigations leading to thesis or dissertation.

(See Gen. 612 for description of related course.)

**FLORICULTURE SECTION****201. Principles of Floriculture. (2-2). Credit 3. I**

Introduction to scientific principles and practices involved in production, distribution, marketing and use of greenhouse and nursery crops, and contribution these plants and plant products make to economy and to modern living.

**206. Woody Ornamental Plants. (2-2). Credit 3. I**

Study of better known woody ornamental trees and shrubs including identification, morphology, classification, nomenclature, and adaptability for use in landscape environments. Prerequisite: Biol. 101.

**307. Landscape Plant Materials. (2-2). Credit 3. II**

Study of special and lesser known groups of ornamental plants including azaleas, camellias, garden roses, bulbs, corms, tubers, and herbaceous flowering plants. Prerequisite: Flor. 206.

**319. Exotic Plants. (2-2). Credit 3. I**

Study of unusual and rare ornamental plants with special emphasis on those from tropic and subtropic zones of world. Ecology, taxonomy, and adaptability to both outdoor and indoor landscape use. Prerequisite: Flor. 307.

**424. Scientific Plant Propagation. (2-2). Credit 3. II**

Study of anatomical, morphological, and physiological considerations involved in regeneration of plants by sexual and asexual methods and their importance in technical procedures involved. Prerequisites: P.P.P. 301, 313.

**425. Landscape Maintenance and Construction. (3-3). Credit 4. I**

Principles and practices of grading, drainage, and construction of landscaped areas, preparation of specifications, cost estimating, soil preparation, transplanting operations, control of plant pests, pruning methods, and arboriculture. Prerequisite: Flor. 307.

**429. Nursery and Greenhouse Crops. (3-3). Credit 4. I**

Application of basic plant sciences to principles and practices involved in production, harvesting, grading, and distribution of plants grown in modern nurseries, greenhouses, other forcing structures, and in field. Prerequisites: P.P.P. 301, 313.

**432. Landscape Horticulture. (2-2). Credit 3. I, II, S**

Application of floriculture to modern living; to acquaint future home owners, agricultural extension agents, and vocational agriculture teachers with landscape arrangement and maintenance of home grounds and use of plants and flowers in home. Prerequisite: Junior classification.

**485. Special Problems. Credit 1 to 4. I, II, S**

Special problems in floricultural science, landscape horticulture, floral designing, or study of subject matter not included in established courses. Prerequisite: Senior classification or approval of Department Head.

**FOR GRADUATES****609. Taxonomy of Ornamental Plants. (2-2). Credit 3. I**

Specialized study of genera, species, varieties, and clones of woody and herbaceous ornamental plants including identification, structure, use, and adaptability to climatic conditions in Southwest. Problems in taxonomy, physiology, and anatomy of these plants.

**610. Tropical Foliage Plants. (2-2). Credit 3. II**

Intensive study of rare and exotic plants of tropical and subtropical regions of world. Identification, adaption, cultural requirements, propagation, and economic importance. Specific problems in taxonomy, physiology, and anatomy of these plants.

**615. Greenhouse Problem Diagnosis. (0-3). Credit 1. I**

Diagnosis of routine problems encountered in management and maintenance of greenhouse facilities. Problems involved in propagation, care, and analysis of plants grown in greenhouses for scientific investigations. Prerequisite: Graduate classification.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Individual problems or research not pertaining to thesis or dissertation. Prerequisite: Approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis or dissertation.

**HORTICULTURE SECTION****201. General Horticulture. (2-2). Credit 3. I, II**

Structure, growth, and development of horticultural plants. Control of environment and plant growth with considerations of biological competition and progressive improvement of crops. Practice in basic principles of propagation and greenhouse production of horticultural crops. Prerequisite: Biol. 101.

**311. Processing Horticultural Crops. (2-3). Credit 3. I**

Study of principles and practices of canning, quick freezing, dehydration, pickling, and juice manufacture of fruits and vegetables. Fundamental concepts of various techniques of preparation, processing, packaging, and use of additives. Processing plants visited.

**319. Orchard Management. (2-2). Credit 3. II**

Study of rootstocks, varieties, sites, pruning, temperature, dormancy, soil management, nutrition, chemical fruit thinning, harvesting, storage, insects, and diseases of peaches, plums, and pears. Prerequisite: Hort. 201. (Offered in 1964-65 and in alternate years thereafter.)

**322. Vegetable Crops Management. (2-3). Credit 3. I**

Factors influencing vegetable crop production; climate, soil, variety, plant growing, transplanting, planting, irrigation, weed, insect and disease control, harvesting, marketing, storage, and greenhouse vegetable production.

**418. Nut Culture. (1-3). Credit 2. II**

Study of orchard management, native grove development, varieties, fruit setting, soils, nutrition, propagation, pest control, harvesting, shelling, storage, and marketing with major emphasis on pecans.

**422. Citrus and Subtropical Fruits. (2-2). Credit 3. I**

Study of history, taxonomy, planting, irrigation, soil management, pruning, hardiness, packing, processing, post harvest physiology, and marketing of Citrus and other subtropical and tropical fruits. (Offered in 1965-66 and in alternate years thereafter.)

**426. Commercial Propagation. (2-2). Credit 3. II**

Study of principles and practices followed in propagation of fruit trees. Study of graft union, congeniality between stocks and scions, adaption of stocks to environment, and propagation practices for important fruits.

**434. Grading and Packing Vegetables. (2-2). Credit 3. I**

Consideration of factors of good quality in market vegetables. Standard grades and packages. Shipping methods. Relation of production methods to quality. Transit losses. Methods of marketing open to producer. Recent trends in marketing and packaging.

**444. Laboratory Examination of Processed Food. (1-3). Credit 2. II**

Practice and theory in chemical, physical, microscopic, and microbiological methods of food analysis and interpretation of results. Federal and State regulations. Prerequisite: Approval of instructor.

**446. Commercial Fruit and Vegetable Canning. (2-3). Credit 3. II**

Advanced course in pilot plant and laboratory operations pertaining to production of canned fruits and vegetables. Prerequisite: Hort. 311.

**481. Seminar. (1-0). Credit 1 each semester. I, II**

Review of current experimental work in field of horticulture, presented by staff members, graduate, and senior students. Required of all senior students in horticulture.

**485. Problems in Horticulture. Credit 1 to 4. I, II, S**

Special problems in fruit and vegetable crop production and processing. Prerequisite: Senior classification or approval of Department Head.

## FOR GRADUATES

**601. Environmental Relations of Fruit Plants. (3-3). Credit 4. I**

Principles of nutrition, water, and temperature related to management practices of fruits. Practice in soil moisture relationships, leaf analyses by flame spectrophotometry, and control of dormancy with growth regulators. (Offered in 1964-65 and in alternate years thereafter.)

**602. Factors Influencing Fruit Production. (3-3). Credit 4. II**

Influence of light, growth regulators, pruning, and structural factors on fruit setting. Chromatographic separation, spectrophotometric identification, biological assay of endogenous growth regulators, chemical fruit setting, and hybridization. (Offered in 1965-66 and in alternate years thereafter.)

**603. Structure of Vegetable Plants. (3-3). Credit 4. II**

Morphological and anatomical features of important groups of vegetable plants related to production and progressive improvement of crop.

**604. Physiology of Vegetable Plants. (3-3). Credit 4. I**

Nutrition, light, vernalization, seed treatment, water, and temperature related to fruit setting and vegetable production. Current developments in hormones, herbicides, and greenhouse vegetable production.

**681. Seminar. (1-0). Credit 1. I, II**

Student and staff participation in review of literature and reporting of current developments in research on production and processing of horticultural crops. Required of all graduate students in Horticulture.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Review of fundamental principles and methods in horticultural research. Practice involves instrumentation and techniques related to research problems.

**691. Research. Credit 1 or more each semester. I, II, S**

Research in horticultural problems for thesis or dissertation.

## Institute of Statistics

Professors Connor, Hartley (Director); Associate Professors Freund, Hocking, Wortham; Assistant Professors Darroch, Dayhoff

**201. Elementary Statistical Inference. (2-2). Credit 3. I, II**

Elementary description of tools of statistical inference including empirical and theoretical distributions, probability, sampling, treatment of both continuous and discrete data, regression and correlation, introduction to analysis of variance and applications to practical problems. Prerequisite: Math. 102 or equivalent.

**406. Statistical Methods. (2-2). Credit 3. I, II, S**

Non-mathematical introduction to concepts of random sampling and statistical inference; estimation and testing hypothesis of means and variances; analysis of variance; regression analysis; chi-square tests. Not to be used for graduate credit by Statistics majors. Prerequisite: Approval of instructor.

## FOR GRADUATES

**601. Statistical Analysis. (3-2). Credit 4. I, II**

Intended for students in engineering, physical, and mathematical sciences. Introduction to probability, probability distributions, and statistical inference; *t*, *F* tests and analysis of variance; regression analysis; elements of experimental design. Prerequisite: Math. 122 or 210.

**603. Biological Statistics Including Bio-Assay. (3-0). Credit 3. II**

Bio-assay for quantitative and quantal responses; absolute and comparative potencies, dose-, time-, and dose x time response curves; stationary and dynamic models for biological populations, prey-predator studies. Prerequisite: Stat. 601 or 605.

**604. Special Problems in Statistical Computation and Analysis. (3-0). Credit 3. I**

Introduction to Fortran programming with emphasis on programming statistical analyses; efficient uses of existing statistical computer programs; generation of ran-



dom numbers and statistical variables; programming of simulation studies; selected topics in statistical analysis not covered in Stat. 601 or 605. Prerequisite: Stat. 601 or 605.

**605. Statistical Analysis. (3-3). Credit 4. I, II**

Intended for students in life, agricultural, and social sciences. Review of estimation and testing hypotheses; analysis of variance and covariance; simple, multiple, and curvilinear regression; introduction to experimental design; introduction to non-parametric methods. Prerequisite: Stat. 406 or equivalent.

**606. Design of Experiments. (2-3). Credit 3. II**

Fundamental principles of design and analysis of experiments; randomized blocks, Latin squares, split plots, factorial experiments; confounding; missing plot techniques. Prerequisite: Stat. 601 or 605.

**607. Sampling. (3-0). Credit 3. I**

Planning, execution, and analysis of sampling from finite populations; simple, stratified, multi-stage, and systematic sampling; ratio estimates. Prerequisite: Stat. 601 or 605.

**608. Least Squares and Regression Analysis. (3-0). Credit 3. II**

Regression analysis, simple, multiple, and curvilinear; orthogonal polynomials; analysis of non-orthogonal and incomplete experiments by least squares methods; computer methods for least squares problems. Prerequisite: Stat. 601 or 605.

**609. Order Statistics and Non-Parametric Methods. (3-0). Credit 3. II**

Use of order statistics and other distribution free statistics for estimation and testing hypotheses, exact non-parametric tests and measures of rank-correlation. Prerequisite: Stat. 601 or 605.

**611. Theory of Statistics. (4-0). Credit 4. I**

The concept of probability, probability distribution, moment generating functions and limit theorem; the theory of estimation and testing hypotheses. Prerequisite: Math. 307.

**612. Theory of Linear Models. (3-0). Credit 3. I**

Theory of least squares; theory of general linear hypothesis and associated small sample distribution theory; analysis of multiple classifications. Prerequisites: Math. 416; Stat. 611.

**613. Intermediate Theory of Statistics. (3-0). Credit 3. I**

General theory of estimation and sufficiency, including maximum likelihood, minimum variance estimation; Neyman-Pearson theory of testing hypothesis; elements of decision theory. Prerequisites: Math. 409; Stat. 611.

**614. Advanced Theory of Statistics. (3-0). Credit 3. II**

Probability measures and distribution functions, random variables, characteristic functions, asymptotic distributions. Prerequisites: Math. 607; Stat. 613.

**615. Stochastic Processes and Time Series. (3-0). Credit 3. I**

Stationary and non-stationary stochastic processes, autoregressive processes and correlogram analysis, harmonic-periodogram and spectral analysis. Markoff and diffusion processes. Prerequisites: Math. 409, 601; Stat. 611.

**616. Multivariate Analysis. (3-0). Credit 3. I**

Multivariate normal distributions and multivariate generalizations of classical test criteria. Hotellings T, discriminant analysis and elements of factor and canonical analysis. Prerequisites: Math. 409; Stat. 601 or 605, 611.

**617. Theory of Sampling. (3-0). Credit 3. II**

General randomization theory of multistage sampling of finite populations, sampling with and without replacements and with equal and unequal probabilities, ratio and regression estimates in multiphase sampling, analytic studies and multiframe problems. Prerequisites: Stat. 607, 611.

**625. Statistical Methods in Reliability. (2-3). Credit 3. S**

Statistical theories pertinent to solution of engineering problems in reliability introduced, established, and applied. Distribution and failure theory include exponential, log normal, gamma, and Weibull. Parameters studied include mean time to failure,

failure rate, variances, and standard deviations, confidence limits, and tests of hypothesis. Prerequisites: I.En. 614; Stat. 601; or approval of instructor.

**685. Problems. Credit 1 to 4. I, II, S**

Individual instruction in selected fields in Statistics; investigation of special topics not within scope of thesis research and not covered by other formal courses. Prerequisites: Graduate classification; approval of Department Head.

**691. Research. Credit 1 or more. I, II, S**

Research for thesis or dissertation. Prerequisite: Graduate classification.

## Structural Mechanics

**468. Statically Indeterminate Structures. (3-0). Credit 3. I**

Matrix algebra; basic structural principles; displacement analysis by real-work, differential-equation, Castigliano's first theorem, and auxiliary-load methods. Analysis of statically indeterminate structures by consistent-distortion method. Displacements of statically indeterminate structures. Treatment of beams, trusses, frames, and curved members. Prerequisite: Aero. 304 or C.E. 345.

**469. Analysis of Structures. (3-0). Credit 3. II**

Displacement analysis by moment-area, elastic-weights, conjugate-beam, virtual-work, and Williot-Mohr methods. Analysis of statically indeterminate structures by three-moment theorem, least-work, elastic-center, column-analogy, slope-deflection, moment-distribution, and relaxation methods. Treatment of beams, trusses, frames, and curved members. Prerequisite: S.M. 468.

**470. Experimental Mechanics. (2-3). Credit 3. II, S**

Mechanical and optical strain gages; brittle coatings, variable resistance strain gages; indicating and recording equipment, photoelasticity, photoelastic coatings, motion measurement. Prerequisites: C.E. 305; E.E. 305 or 307.

## FOR GRADUATES

**601. Theory of Elasticity. (4-0). Credit 4. I, S**

Study of analysis of stress and strain in two and three dimensions, equilibrium and compatibility equations, strain, energy methods, torsion of noncircular sections, flexure, axially symmetric problems. Prerequisite: Math. 601 or registration therein.

**602. Structural Stability. (4-0). Credit 4. II**

Primary buckling of centrally or eccentrically loaded columns; primary buckling of centrally loaded columns by torsion; buildup columns; lateral buckling of beams; buckling of rings. Prerequisites: Math. 308; approval of instructor.

**603. Theory of Plates and Shells. (4-0). Credit 4. I**

Small-deflection thin plate theory for plates of various shapes and support conditions; bending of anisotropic plates; plates under combined lateral loads and in-plane forces; large-deflection thin plate theory; theory of shells; stability of plates and shells. Prerequisite: Math. 601 or registration therein.

**604. Vectors and Tensors in Mechanics. (2-0). Credit 2. I, S**

Unified study of continuous media using vectors and tensors.

**605. Flow and Fracture of Solids. (4-0). Credit 4. II**

Study of deformation of solids; elastic, very viscous, and ideally plastic substances. Prerequisite: S.M. 601.

**606. Theory of Thermal Stresses. (4-0). Credit 4. II**

Basic study of heat conduction, thermoelasticity and thermoinelasticity as related to thermal stresses. Prerequisites: S.M. 601; approval of instructor.

**607. Matrix Methods of Structural Analysis. (3-0). Credit 3. II, S**

Unified treatment of two- and three-dimensional frames by specialized matrix methods. Prerequisite: S.M. 468.

**608. Experimental Structural Analysis. (1-3). Credit 2. II, S**

Study of observations and measurements, dimensional analysis, prediction equations, and theory of similitude; design, construction, and use of structural models. Prerequisites: S.M. 468, 470 or registration therein.

**609. History of Structural Mechanics. (2-0). Credit 2. II, S**

Study of history of development of structural mechanics to present time. Prerequisite: Approval of instructor.

**610. Theory of Shells. (4-0). Credit 4. II**

Continuation of study of theory of shells introduced in S.M. 603. Limited to study of linear shell theory. Equations formulated using Lamé's surface parameters. Membrane analysis, bending analysis, and shallow shell theory. Prerequisite: S.M. 603.

### Department of Veterinary Anatomy

Professors Gibbs, Milliff (Head); Associate Professor Kemler; Assistant Professor Greeley; Instructor Martin

**202. Veterinary Anatomy. (1-6). Credit 3. II**

Osteology of horse and cow. Topographical dissection of cow. Histology of tissues and organs of cow. Prerequisite: Biol. 107 or equivalent.

**301. Anatomy. (1-9). Credit 4. I**

Osteology, dentition, and arthrology of domestic animals and topographical dissection of dog.

**302. Anatomy. (1-9). Credit 4. II**

Topographical dissection of cow and comparative study of horse, cat, and pig. Prerequisite: V.A. 301.

**303. Histology. (2-6). Credit 4. I**

Microscopic study of basic tissues and of organs, excluding organs of reproduction.

**304. Embryology. (2-6). Credit 4. II**

Microscopic study of reproductive organs of domestic animals, and of serial sections of chick and pig embryos. Prerequisites: V.A. 301, 303.

**406. Neuroanatomy. (0-6). Credit 2. III**

Gross and microscopic anatomy of nervous systems of domestic animals. Prerequisite: V.A. 303.

**501. Applied Anatomy. (1-6). Credit 3. III**

Anatomy of areas of surgical and clinical importance in domestic animals. Prerequisite: V.A. 302.

### FOR GRADUATES

**601. Veterinary Anatomy. (1-9). Credit 4 each semester. I, II**

Topographical dissection of domestic animals. Prerequisite: V.A. 302.

**602. Veterinary Anatomy. (2-6). Credit 4. I, II**

Microscopic structure of anatomical systems of domestic animals. Prerequisite: V.A. 303.

**603. Neuroanatomy. (2-6). Credit 4. II**

Study of gross, developmental, and microscopic anatomy of nervous systems of domestic animals. Prerequisite: V.A. 406.

**604. History of Anatomy. (1-0). Credit 1. I, II, S**

Discussion of biographies and contributions to field of anatomy of most important anatomists from 500 B.C. to present. Prerequisite: Graduate major in veterinary anatomy.

**681. Seminar. (1-0). Credit 1. S**

Review and discussion of current scientific work in anatomy and related subjects. Prerequisite: Graduate major or minor in veterinary anatomy.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Problems in either gross or microscopic anatomy along lines chosen by individual. Prerequisites: V.A. 406; approval of Department Head.



**691. Research. Credit 1 or more each semester. I, II, S**

Original research on selected thesis problem in anatomy. Prerequisite: Graduate major in veterinary anatomy.

### Veterinary Clinics

**501. Clinics. (0-27). Credit 9. I**

Groups participate on rotating schedule in various areas:

**(1). Large Animal Clinics**

Students required to assume full responsibility for diagnosis, care, and treatment of patients assigned under supervision of instructors. Special emphasis given daily to selected clinical cases.

**(2). Small Animal Clinics**

Students required to assume full responsibility for diagnosis, care, and treatment of patients assigned under supervision of instructors. Special emphasis given daily to selected clinical cases.

**(3). Ambulatory Clinics**

Under supervision of instructor, students are taken on calls to private farms or university herds for training and experience in diagnosis and treatment of animal diseases under actual farm and ranch conditions.

**(4). Clinical Laboratory and Radiology**

Practice in routine laboratory procedures including hematology, urine analysis, radiography, and radiation therapy.

**(5). Poultry Diagnosis**

Supervised practice in diagnosis and treatment of poultry diseases using actual submissions to Poultry Disease Laboratory. Library research and report writing.

**(6). Applied Pathology**

Supervised participation in pathological examinations of diseased animals and their tissues through use of necropsy, biopsy and related techniques with emphasis on interpretation of observations and on technical methods.

**(7). Clinical Parasitology**

Laboratory methods utilized in diagnosis of parasites and parasitic diseases of domestic and wild animals and birds.

**(8). Food Hygiene and Public Health**

Routine inspection procedures of foods of animal origin. Epidemiology problems and regulatory control of animal diseases.

Prerequisite: V.M.S. 573.

**502. Clinics. (0-27). Credit 9. II**

Continuation of V.C. 501. Prerequisite: V.C. 501.

**503. Clinics. (0-30). Credit 10. III**

Continuation of V.C. 502. Prerequisite: V.C. 502.

### Department of Veterinary Medicine and Surgery

Professors Banks, Calliham (Head), Redmond; Associate Professors Ellett, Range, Romane; Assistant Professors Boyd, Denton, Evers, Gowing, Jones, Piermattei, Titus, Young; Instructors Bell, Berkley, Bowen, Scott; Lecturer Price

**311. History of the Veterinary Profession. (1-0). Credit 1. I**

History of development of veterinary art and science, veterinary education, veterinary societies and regulatory agencies, and professional veterinary medicine.

**412. Radiology. (2-0). Credit 2. I**

Provides student with foundation of veterinary radiology. Includes physical properties and production of ionizing radiation, roentgenographic and darkroom procedures, hazards and protection from excessive radiation, and basic principles and uses of radiation as therapeutic agent. Prerequisite: V.Pat. 443.

**570. General Surgery. (2-3). Credit 3. II**

Principles of anesthesia, surgery, and dentistry of domestic animals. Prerequisites: V.Pat. 444; V.P.P. 430.

**571. Diseases of Small Animals. (5-0). Credit 5. II**

Study of infectious and non-infectious diseases of small animals. Prerequisite: V.M.S. 412.

**572. Clinical Medicine. (0-3). Credit 1. II**

Clinical practices, restraint of animals, and diagnostic procedures. Prerequisite: V.M.S. 412.

**573. Obstetrics and Reproductive Diseases. (3-3). Credit 4. III**

Genital and reproductive diseases including prevention, diagnosis, and treatment; pregnancy diagnosis, obstetrics, and diseases of newborn. Prerequisite: V.P.P. 429.

**574. Diseases of Large Animals. (5-0). Credit 5. III**

Etiology, diagnosis, prognosis, treatment, and prevention of infectious and non-infectious diseases common to all farm animals and those specific to horses and swine. Prerequisites: V.M.S. 412; V.Pat. 548.

**575. Operative Surgery. (2-4). Credit 3. III**

Correction of diseases by surgery. Application of art and science in surgical principles and techniques. Prerequisite: V.M.S. 570.

**576. Clinical Medicine. (0-3). Credit 1. III**

Application of arts of clinical medicine. Prerequisite: V.M.S. 572.

**577. Diseases of Large Animals. (3-0). Credit 3. I**

Etiology, diagnosis, prognosis, treatment, and prevention of infectious and non-infectious diseases of ruminant animals. Prerequisite: V.M.S. 574.

**578. Laboratory and Domestic Animal Health Management. (4-0). Credit 4. II**

Environmental conditions necessary for health of laboratory animals, poultry, small animals, and livestock. Prophylactic practices in nutrition, sanitation, and disease control. Prerequisites: An.Sc. 320; V.M.S. 574.

**579. Practice Management. (2-0). Credit 2. III**

Business principles, management practices, economic factors, and ethics of veterinary medical practice. Prerequisite: V.M.S. 576.

**581. Clinical Seminar. (1-0). Credit 1. II**

Various aspects of special or complicated diseases presented by panel from staff of College of Veterinary Medicine. Students participate with staff in discussions of case and material. Presentations and discussions based primarily on cases submitted to Veterinary Hospital. Prerequisite: V.C. 501.

**582. Clinical Seminar. (1-0). Credit 1. III**

Continuation of V.M.S. 581. Prerequisite: V.C. 502.

(See V.C. 501, 502, 503 for descriptions of related courses.)

### FOR GRADUATES

**603. Veterinary Surgery. Credit 1 to 8 each semester. I, II**

Special surgery of large or small animals. Prerequisite: Degree of Doctor of Veterinary Medicine.

**612. Diagnostic Radiology. Credit 2 or 3 each semester. I, II, S**

Radiographic interpretation of large and small animals with special emphasis on film reading. Use of special techniques including contrast media as diagnostic aids discussed and demonstrated. Prerequisite: Degree of Doctor of Veterinary Medicine.

**621. Reproduction Diseases of Female Domestic Animals. (2-0). Credit 2. I, II, S**

Advanced study of diagnosis, treatment, and control of diseases primarily affecting reproduction in female domestic animal. Prerequisite: Degree in Veterinary Medicine.

**622. Veterinary Andrology. (2-0). Credit 2. I, II, S**

Advanced study of diagnosis, treatment, and control of diseases primarily affecting reproduction in male domestic animal, including study of evaluation of semen and

its preparation for use by artificial insemination. Prerequisite: Degree in Veterinary Medicine.

**685. Problems. Credit 1 to 8 each semester. I, II**

Original investigations of problems in field of surgery, therapeutics, or radiology. Prerequisite: Degree of Doctor of Veterinary Medicine.

**691. Research. Credit 1 or more each semester. I, II**

Research for thesis.

## Department of Veterinary Microbiology

Professors Flowers, Grumbles (Head), Jungerman; Associate Professors Franklin, Hall, Moore; Assistant Professors Huff, Livingston, Meinecke; Instructor Grimes

**301. Microorganisms in Animal Diseases. (2-4). Credit 3. I**

Study of function of microorganisms in maintaining health and causing diseases in domestic animals. Rumen microflora. Preservation and spoilage of meat. Methods by which infectious diseases are transmitted and prevented. Study of selected groups of pathogens and specific diseases. Prerequisite: Biol. 206.

**334. Poultry Diseases. (2-2). Credit 3. II**

Poultry sanitation and diseases. Prevention and control of environmental nutritional, parasitic, and contagious diseases. Prerequisite: Biol. 206. (Offered in 1964-65 and in alternate years thereafter.)

**335. Microbiology. (3-5). Credit 5. II**

Principles of bacteriology, infection, and immunity. Morphology, physiology, antigenic structure, and identifying characteristics of bacteria studied in detail. Consideration given to production of antibiotics and biologicals. Mechanism of infections and fundamentals of immunity studied and correlated.

**436. Microbiology. (3-5). Credit 5. III**

Comprehensive study of pathogenic microorganisms and their role in causing disease. Special emphasis given to antigenicity and relation of each organism to immune phenomena. Laboratory diagnosis and species identification stressed. Prerequisite: V.Mi. 335.

**438. Virology and Serology. (2-3). Credit 3. I**

Detailed study of nature of viruses and Rickettsiae including their propagation, isolation, and identification. Reaction between virus and host cell. Theories, principles, and use of serologic procedures for identifying infectious agents, making a diagnosis, and measuring antibody response. Prerequisite: V.Mi. 436.

**485. Problems. Credit 1 to 3. I, II, S**

Directed, individual study of selected problem in veterinary microbiology approved by instructor. Prerequisite: Approval of Department Head.

**595. Poultry Diseases. (2-0). Credit 2. I**

Study of avian diseases with emphasis on those of greatest economic importance. Prerequisite: V.Mi. 438.

(See V.C. 501, 502, 503 for descriptions of related courses.)

## FOR GRADUATES

**643. Veterinary Microbiology. (3-4). Credit 4. I, II**

Study of pathogenic microorganisms; their cultural and biological characteristics and pathogenicity.

**646. Avian Virus Diseases. Credit 1 to 4. I**

Study of viral diseases of poultry including methods of isolation and identification of causative agents. Practice consists of conducting post mortem examinations and special diagnostic procedures on birds received daily for necropsy. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**647. Veterinary Virology. Credit 1 to 4. II**

Detailed study of virus infections in animals, including types of infections, mode



of transmission, intracellular pathology, epidemiology, isolation and identification of inciting agents. Practice includes tissue cultivation, animal inoculations, and diagnostic tests. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**648. Veterinary Mycology. Credit 1 to 4. II**

Study of actinomycetes, yeasts, and molds that are pathogenic to man and animals; morphology, cultural characteristics, pathogenicity and identification. Practice consists of exercises in cultural methods, morphological characteristics, biochemical reactions and diagnosis. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**649. Immunology. (3-3). Credit 4. I**

Comprehensive study of various immune phenomena correlated with study of biological production, potency, and safety testing. Prerequisites: V.Mi. 335, 438, or the equivalent.

**681. Seminar. (1-0). Credit 1. I, S**

Review and discussion of current scientific work and research in field of microbiology and related subjects. Prerequisite: Graduate major or minor in microbiology or related fields.

**685. Problems. Credit 1 to 4 each semester. I, II**

Problems course in microbiology. Prerequisites: Degree of Doctor of Veterinary Medicine; approval of Department Head.

**691. Research. Credit 1 or more. I, II**

Research for thesis or dissertation.

## Department of Veterinary Parasitology

Professor Turk (Head); Associate Professors Bell, Galvin; Assistant Professor Smith

**483. Parasitology. (2-2). Credit 3. III**

Study of more important and commonly-occurring parasites and parasitic diseases of domestic animals. Practice consists of laboratory and diagnostic methods used in parasitology, utilizing fresh and preserved material obtained from field, clinics, and necropsies. Signs, diagnosis, treatment, and control of parasitic diseases emphasized. Prerequisite: V.A. 302.

**484. Parasitology. (2-2). Credit 3. I**

Study of more important and commonly-occurring parasites and parasitic diseases of domestic animals. Helminth, protozoan, and arthropod parasites and diseases. Signs, diagnosis, treatment, and control emphasized. Prerequisite: V.Par. 483.

**487. Parasites of Farm Animals and Poultry. (2-2). Credit 3. II**

Study of some of more important internal and external parasites of domestic animals and poultry. Life cycles, pathogenicity, and economic and public health aspects stressed with suggested methods for control. Open to agricultural students. Prerequisite: Senior classification.

(See V.C. 501, 502, 503 for descriptions of related courses.)

## FOR GRADUATES

**601. Parasitology. Credit 1 to 4 each semester. I**

Detailed study of more important helminth parasites of domestic animals, including their identification, distribution, and life history. Prerequisite: V.C. 503 or equivalent.

**685. Problems. Credit 1 to 4 each semester. I, II, S**

Special problems concerned with parasites of domestic animals or poultry. Prerequisites: V.Par. 601 or equivalent; approval of instructor.

**691. Research. Credit 1 or more each semester. I, II, S**

Research for thesis.

## Department of Veterinary Pathology

Professors Beasley, Bridges (Head), Maurer; Associate Professors Henson, Dollahite; Assistant Professor Pierce; Instructors Bullard, Robinson

### 443. General Pathology. (4-3). Credit 5. III

Elementary disease processes and their causes, including study of gross and minute appearance of diseased tissue. Such processes as inflammation, necrosis, gangrene, atrophy, hypertrophy, ulceration, various degenerations, infiltrations, pigmentations, and tumor formations are considered. Practice consists of microscopic study of these processes and instruction in laboratory technique. Prerequisites: V.A. 302, 304.

### 444. Special Pathology. (4-3). Credit 5. I

Lectures on special pathology of organs and systems. Infectious and non-infectious diseases. Mechanism of development of lesions and their relationship to clinical signs emphasized. Lectures illustrated liberally with color slides. Laboratory work consists of studies in gross and microscopic pathology. Prerequisite: V.Pat. 443.

### 548. Nutritional and Metabolic Diseases. (3-0). Credit 3. II

Clinical manifestations, pathologic physiology, pathologic morphology, and causative mechanisms involved in various nutritional and metabolic diseases of animals. Prerequisites: B.N. 312; V.Pat. 444; V.P.P. 427.

### 549. Clinical Pathology. (2-0). Credit 2. I

Interpretation of qualitative and quantitative changes in body fluids, secretions, excretions, and exudates in diagnosis of disease. Prerequisites: B.N. 312; V.Pat. 444.

### 585. Problems in Pathology. Credit 1 to 4 each semester. I, II, S

Elective course for undergraduates who wish to supplement standard required courses. Problems assigned in gross or microscopic pathology or in pathological technique. Prerequisites: V.Pat. 443; approval of instructor.

(See V.C. 501, 502, 503 for descriptions of related courses.)

## FOR GRADUATES

### 643. Gross Pathology. Credit 1 to 6. I, II, S

Student studies gross pathological changes at necropsies performed daily. Follows selected tissues through suitable histopathological techniques and corrects gross diagnosis in light of microscopic findings. Confirmatory bacteriologic methods utilized where indicated. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

### 644. Locomotor and Skeletal Diseases. Credit 1 or 2. I, S

Changes taking place in diseased bones, joints, and muscles studied with respect to their nature and probable causes, and with special reference to lameness of horse. Frequent use made of Mark Francis Collection of Bone and Joint Pathology. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

### 645. Neoplastic Diseases. Credit 1 to 8. I, II, S

Theoretical, histopathological, and clinical aspects of neoplasia. Diagnosis of neoplastic and related conditions in all species. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

### 646. Nutritional Diseases. Credit 2 to 4. II

Gross and microscopic tissue changes found in experimentally produced nutritional deficiencies are considered in comparison with clinically encountered deficiencies and with other conditions from which they must be differentiated. Prerequisite: Degree of Doctor of Veterinary Medicine or other suitable preparation.

### 647. Metabolic Diseases. Credit 1 or 2. S

Pathology of diseases due to major disorders of metabolism, non-nutritional and non-infectious. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

### 648. Reproductive Diseases. Credit 1 to 4. S

Theoretical and practical pathology of gross and microscopic lesions in reproductive organs with especial reference to bovine sterility. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**649. Gross Post-Mortem Diagnosis. Credit 1 to 6. I, II, S**

Advanced training in recognition, interpretation, and description of tissue changes encountered. Specific diagnoses are derived and defended. Prerequisites: At least 4 semester hours of credit in V.Pat. 643.

**650. Neuropathology of Animals. Credit 1 to 4. I, S**

In addition to study and interpretation of gross and microscopic lesions of central and peripheral nervous systems, major attention given in theory and practice to special laboratory techniques necessary to demonstrate such lesions. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**651. Microscopic Diagnosis. Credit 1 to 6. I, II, S**

Advanced training in diagnosis, applied especially to "problem" cases currently encountered in Department's pathological diagnostic service. Routine and special histopathological methods employed. Prerequisites: Total of at least 10 semester hours of credit in V.Pat. 643, 645.

**658. Pathological Technique. Credit 1 to 6. I, II, S**

Art and science of preparing animal tissues, fluids, and exudates for microscopic or other special examination. Enrollment limited to number who can be accommodated in routine of departmental laboratory. Prerequisite: Fair knowledge of general chemistry.

**659. Sheep Diseases. Credit 1 to 4. I**

Pathology, etiology, and symptomatology of economically important diseases affecting sheep in all major sheep-producing countries of world. Prerequisite: Degree of Doctor of Veterinary Medicine or equivalent.

**681. Seminar. (1-0). Credit 1. I, II, S**

For graduate and special students in veterinary pathology. Presentation and discussion of special topics and research data concerning pathology and pathogenesis of diseases. Prerequisite: Approval of Department Head.

**685. Problems. Credit 1 to 4. I, II, S**

Advanced special problems concerned with pathogenesis and pathology of disease. Prerequisite: V.Pat. 444 or equivalent; approval of Department Head.

**691. Research. Credit 1 or more each semester. I, II, S**

Research reported by writing of thesis or dissertation as partial requirement for Master of Science or Doctor of Philosophy degree.

## **Department of Veterinary Physiology and Pharmacology**

Professors Burns (Head), Davis; Associate Professor McCrady; Assistant Professors Clark, Szabuniewicz, McMurry; Instructors Amoss, Norton

**323. Physiology of Farm Animals. (2-2). Credit 3. II**

Consideration of physiology essential to understanding of diseases of farm animals. For students in agriculture. Prerequisites: Chem. 228 or 231; V.A. 202.

**326. Physiology. (3-3). Credit 4. II**

Introduction to physiology, physicochemical basis of cellular physiology, dynamics of nerve and muscle, functions of circulatory system. Prerequisites: B.N. 312; registration in V.A. 302 and 304.

**427. Physiology. (3-3). Credit 4. III**

Functions of respiratory system, renal function and acid-base balance, mechanisms of digestion, absorption and excretion, metabolism and energy exchange, minerals and vitamins, neurophysiology. Prerequisite: V.P.P. 326.

**429. Endocrinology. (2-3). Credit 3. I**

Introduction to endocrinology, physiology and biochemistry of endocrine secretions, reproductive processes of domestic animals. Prerequisite: V.P.P. 427.

**430. Pharmacology. (3-3). Credit 4. I**

Pharmacologic principles; central nervous system depressants and stimulants; local anesthetics; autonomic drugs; skeletal muscle relaxants; anti-histaminics.



Practice consists of study of action of drugs on experimental animals. Prerequisite: Registration in V.P.P. 429.

**529. Pharmacology. (3-3). Credit 4. II**

Agents affecting blood formation and coagulation; cardio-vascular drugs; locally-acting drugs; expectorants and antitussives; gastrointestinal agents; water, ions, and nutrients, blood derivatives and plasma substitutes; diuretics; local and systemic anti-infectives; parasiticides; hormones; uterine stimulants and sedatives. Practice consists of exercises in pharmacodynamics, bio-assay, metrology, pharmaceutical arithmetic, compounding and dispensing. Prerequisite: V.P.P. 430.

**530. Toxicology. (3-2). Credit 4. III**

Occurrence, signs, symptoms, lesions, treatments; prevention and management of inorganic and organic poisonings. Clinical manifestations, lesions and management of animals affected by poisonous plants. Practice consists of observing response of animals to poisons; therapy; chemical detection of common poisons. Prerequisites: Registration in V.P.P. 529.

**585. Problems in Physiology. (0-3). Credit 1. I, II, III**

Course for undergraduate students who desire additional laboratory work in physiology to supplement required courses. Prerequisite: V.P.P. 529.

**FOR GRADUATES**

**601, 602. Animal Physiology. (3-3). Credit 4 each semester. I, II**

Recent phases of physiology; modern experimental methods. Work arranged to suit needs of student and in harmony with his previous training. Prerequisite: Basic courses in morphology and organic chemistry.

**605, 606. Veterinary Toxicology. (3-3). Credit 4 each semester. I, II**

Original investigations and detailed studies of poisons or poisonous plants and their effects on domestic animals. Prerequisite: V.P.P. 530.

**607, 608. Veterinary Pharmacology. (3-3). Credit 4 each semester. I, II**

Modern methods of research in pharmacology and pharmaceutical processes. Original research in studying actions and uses of drugs. Prerequisite: V.P.P. 529.

**611, 612. Veterinary Physiology. (3-3). Credit 4 each semester. I, II**

Detailed study of specific phases of physiology of domestic animals. Prerequisites: V.A. 304; V.P.P. 429.

**685. Problems. Credit 1 to 4 each semester. I, II**

Problems in physiology, pharmacology, or toxicology. Prerequisite: Degree of Doctor of Veterinary Medicine or appropriate specialized training.

**691. Research. Credit 1 or more each semester. I, II**

Original investigations in veterinary physiology, pharmacology, or toxicology to be submitted by writing of thesis as partial fulfillment for Master of Science degree. Prerequisite: Approval of Department Head.

**Department of Veterinary Public Health**

Professor Jaggi (Head); Assistant Professor Russell

**491. Animal Hygiene. (2-2). Credit 3. I, II**

Livestock sanitation and prevention, control, and eradication of diseases of farm and ranch animals. Prerequisites: Biol. 206; V.P.P. 323; senior classification in agriculture.

**590. Food Hygiene. (2-2). Credit 3. III**

Study of dairy industry as related to public health and practice of veterinary medicine. Quality tests, sanitation, and legal control methods. Prerequisite: V.Pat. 548.

**591. Food Hygiene. (2-0). Credit 2. I**

Study of hygienic methods, regulations, and inspection procedures governing processing of foods of animal origin. Prerequisite: V.P.H. 590.

**594. Principles of Epidemiology. (2-3). Credit 3. II**

Basic principles and methods of epidemiology with application to zoonanthropotic diseases. Prerequisite: V.P.H. 591.

**595. Public Health. (3-0). Credit 3. III**

Public health organization, administration, and methods of disease investigation and control with special emphasis on veterinary public health. Prerequisite: V.P.H. 594.

(See V.C. 503 for description of related course.)

**FOR GRADUATES****601. Food Hygiene. (3-4). Credit 4. I**

Study of causes and evidence of spoilage, and detection of adulterants in fresh, canned, and cured foods of animal origin. Prerequisite: V.P.H. 591 or 595.

**685. Problems. Credit 1 to 4 each semester. I, II**

Problems course in veterinary public health. Prerequisite: Degree of Doctor of Veterinary Medicine or approval of Department Head.

**Department of Wildlife Science**

Professors Baldauf, W. B. Davis (Head); Associate Professor R. B. Davis; Assistant Professors Carter, Teer; Instructor Inglis

**201. Wildlife Conservation and Management. (3-0). Credit 3. I, II**

Introduction to wildlife and fishery resources of United States with special reference to Texas. Account of what has happened to North American wildlife with consideration of specific plans and methods for its rehabilitation, maintenance, and increase.

**202. Natural History of the Vertebrates. (2-2). Credit 3. II**

Natural history of fishes, amphibians, reptiles, birds and mammals, as exemplified by selected representatives of each group. Not open to wildlife science majors.

**300. Field Studies. Credit 3, S**

Wildlife survey of selected areas. Studies of plant-animal interrelationships, birds, mammals, and other native vertebrates; experience in collecting and preparing study skins of birds, mammals, reptiles, and amphibians. Prerequisite: Junior classification or approval of Department Head.

**304. Conservation and Management of Fishes. (3-0). Credit 3. II**

Classification, habits, economic importance, and conservation of fishes. Not open to wildlife science majors.

**311. Ichthyology (Fresh Water). (2-3). Credit 3. I**

Designed to familiarize student with fresh-water fishes of world. Subject matter will be mainly systematic, but evolution, ecology, life history, and economy of more important species will be treated. Prerequisite: Biol. 107.

**312. Ichthyology (Marine). (2-3). Credit 3. S**

Study of marine fishes of world, emphasizing fishes of Texas. Life history, ecology, distribution, evolution, and economic values of important species. Prerequisite: W.S. 311 or approval of instructor. (Offered at the Marine Laboratory, Galveston.)

**315. Herpetology. (2-2). Credit 3. II**

Introduction to study of structure, adaptation, classification, distribution, and economic importance of amphibians and reptiles. Prerequisite: Biol. 107.

**316. Field Herpetology. (0-3). Credit 1. II**

Field work involving collection and preservation of herpetological specimens; natural history; ecological relations. Prerequisite: W.S. 315 or registration therein.

**400. Fisheries Survey. Credit 4. S**

Distribution, identification, field and laboratory techniques. Prerequisite: Junior classification or approval of Department Head. (Offered at the Marine Laboratory, Galveston.)

**401. General Mammalogy. (2-2). Credit 3. I**

Study of structure, classification, and economic relations of mammals. Foundation for wildlife science, also for museum work. Prerequisite: Biol. 107.

**402. General Ornithology. (2-2). Credit 3. II**

Introduction to study of birds, their structure, classification, geographic distribution, ecologic relations, and economic status. Foundation for wildlife science, also for museum work. Prerequisite: Biol. 107.

**403. Animal Ecology. (2-3). Credit 3. I**

Composition, structure, and energy relationships of plant-animal communities. Interaction of physical and biotic factors as they affect population levels and community development. Prerequisite: R.S. 316 or approval of instructor.

**408. Techniques of Wildlife Management. (2-3). Credit 3. II**

Methods and techniques in maintaining and increasing desirable wildlife and regulating populations generally, with emphasis on practical aspects. Prerequisite: Senior classification in wildlife science or approval of instructor.

**410. Conservation and Management of Fishes. (3-0). Credit 3. II**

Basic knowledge from ichthyology, biology of fishes, and limnology related to applied aspects of fresh water and marine fishery science. Emphasis placed on methods of fish culture, habitat and population manipulation, and fundamentals of farm pond management.

**416. Animal Population Dynamics. (2-2). Credit 3. II, S**

Study of modern theory of population dynamics, ecology, and exploitation with particular attention to growth forms of populations, reproduction and rates of increase, mortality, regulation and yield of natural populations. Prerequisite: Stat. 201 or 406 or approval of instructor. (Summer offering for fisheries majors at Marine Laboratory, Galveston.)

**417. Biology of Fishes. (2-2). Credit 3. I**

Treats biology of fishes, including respiration, sense organs, feeding habits, breeding habits, anatomy, and adaptations to environment. Emphasis placed upon various physiological and morphological features of fishes. Prerequisite: Biol. 107.

**485. Wildlife Problems. Credit 1 to 3. I, II, S**

Individual study and research on selected problem approved by instructor. Prerequisite: Junior or senior classification.

**FOR GRADUATES****601, 602. Vertebrate Systematics. (1-6). Credit 3 each semester. I, II**

Theory and practice of taxonomy as applied to vertebrates. Prerequisites: W.S. 311, 315, 401, or 402, depending on group selected. (Offered in 1964-65 and in alternate years thereafter.)

**603. Vertebrate Ecology. (1-6). Credit 3. II**

Ecology and life histories of vertebrates with special reference to birds and mammals. Considerations given to community and environmental relations. Prerequisite: W.S. 403 or equivalent. (Offered in 1964-65 and in alternate years thereafter.)

**608. Techniques of Wildlife Management. (2-0). Credit 2. II**

Special techniques and current development in wildlife management practices. Prerequisite: W.S. 408 or equivalent. (Offered in 1964-65 and in alternate years thereafter.)

**609. Wildlife Research Methods. (2-0). Credit 2. I**

Study of research methods applied to wildlife management. (Offered in 1964-65 and in alternate years thereafter.)

**681. Seminar. (1-0). Credit 1 each semester. I, II**

Important current developments in wildlife field with special reference to literature. Prerequisite: Senior or graduate classification.

**685. Problems. Credit 2 to 6 each semester. I, II, S**

Credit adjusted in accordance with requirements of each individual case.

**691. Research. Credit 1 or more each semester. I, II, S**

Original research on selected wildlife problem to be used in thesis or dissertation.



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